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1999

EPA Superfund
Record of Decision:

ABERDEEN PROVING GROUND (EDGEWOOD AREA)
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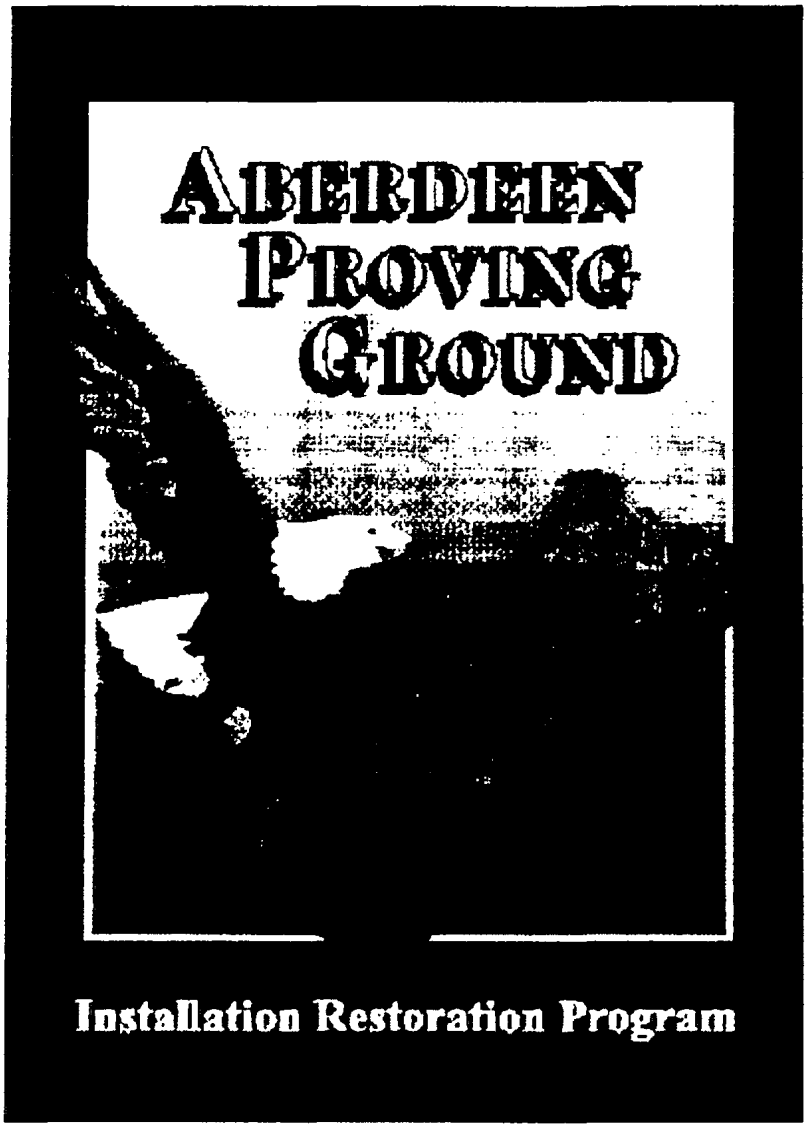
EDGEWOOD, MD
06/11/1999



CLUSTER 3, SITE 3, OLD BUSH RIVER ROAD DUMP
BUSH RIVER STUDY AREA, EDGEWOOD AREA
ABERDEEN PROVING GROUND, MARYLAND
RECORD OF DECISION
FINAL

CLUSTER 3, SITE 3
OLD BUSH RIVER ROAD DUMP
BUSH RIVER STUDY AREA
EDGEWOOD AREA
ABERDEEN PROVING GROUND

RECORD OF DECISION

FINAL

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ACRONYMS

APG	Aberdeen Proving Ground
ARARs	Applicable or Relevant and Appropriate Requirements
BRSA	Bush River Study Area
BTAG	Biological Technical Assessment Group
COPCs	contaminants of potential concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DDTr	total of pesticides DDT, DDD, and DDE
DSERT	Defense Sites Environmental Restoration Tracking System
FAWQC	Federal Acute Water Quality Criteria
FFA	Federal Facility Agreement
FS	Feasibility Study
HEAST	Health Effects Assessment Summary Tables
HI	hazard index
HQ	hazard quotient
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
LUCAP	Land Use Control Assurance Plan
MCLs	Maximum Contaminant Levels
MDE	State of Maryland Department of the Environment
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OU	operable unit
PAHs	polynuclear aromatic hydrocarbons
RAB	Restoration Advisory Board
RBAs	risk-based activities
RBCs	risk-based concentrations
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Agreement
RFI	RCRA Facility Investigation
RfD	reference dose
RI	remedial investigation
RME	reasonable maximum exposure
ROD	record of decision
TRV	Toxicity Reference Value
UCL	upper confidence limit
USEPA	United States Environmental Protection Agency

1. THE DECLARATION

1.1 SITE NAME AND LOCATION

Cluster 3, Site 3
Old Bush River Road Dump
Bush River Study Area
Aberdeen Proving Ground
Harford County, Maryland

1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) document presents the remedial action selected to reduce the risks posed by the Old Bush River Road Dump located at the Bush River Study Area at Aberdeen Proving Ground (APG). The remedial action is intended to comply with the National Environmental Policy Act of 1969. The selection of the remedial action was conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 as amended by the Superfund Amendments and Reauthorization Action (SARA) of 1986, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for the site.

The Maryland Department of the Environment (MDE) concurs with the selected remedy at this site.

1.3 ASSESSMENT OF SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the remedial action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

1.4 DESCRIPTION OF THE SELECTED REMEDY

The Cluster 3 cleanup is part of a comprehensive environmental investigation and cleanup currently being performed at APG under the CERCLA program. APG is divided into 13 study areas that encompass potential sources of contamination. The Old Bush River Road Dump of Cluster 3 is part of the Bush River Study Area. The remaining clusters of the Bush River Study Area and other study areas are being addressed as separate actions.

This action addresses the principal threats at the Old Bush River Road Dump by constructing a soil cap. The soil cap reduces migration of contaminants by reducing infiltration and stabilizing the Old Bush River Road Dump (OBRRD) to prevent erosion of surface soil, and attenuates the detonation of a 4.2-in. chemical mortar. The selected remedy for the OBRRD will include long-term monitoring and institutional controls which will include:

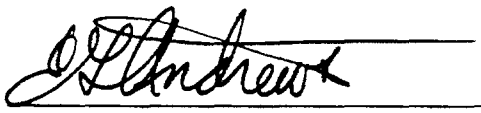
- The cap will be inspected for erosion, subsidence, vegetation density, and any other problems that may impede performance of the soil cap. Sediments downgradient to the OBRRD will be sampled.

Because the remedy does not allow for unrestricted future use of the site, a review will be conducted within 5 years after commencement of remedial actions to ensure adequate long-term protection of human health and the environment is maintained.

Institutional controls will be implemented in the area. A 6-foot fence with warning signs will be maintained around the OBBRD to restrict access. In addition. the restrictions will be included in APG's Geographical Information System (GIS), which is used in documenting APG's Real Property Master Plan.

1.5 STATUTORY DETERMINATIONS

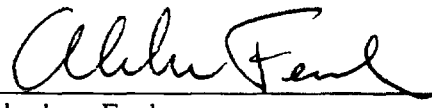
The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and are cost-effective. The remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable. The capping of the OBRRD reduces the mobility of contaminants by placing them in controlled, monitored locations. However, it does not meet the statutory preference for treatment that reduces the volume or toxicity of contaminants. With respect to landfill wastes, the potential presence of unexploded ordnance (UXO) supports containment rather than a removal remedy. Because the remedy does not allow for unrestricted future use of the site, a review will be conducted within 5 years after commencement of remedial actions to ensure adequate long-term protection of human health and the environment is maintained.



11 Feb 99

EDWARD L. ANDREWS
Major General, U.S. Army
Commander, U.S. Army Aberdeen Proving Ground

Date



6/11/99

Abraham Ferdas
Director
Hazardous Site Control Division
U.S. Environmental Protection Agency, Region III

Date

2. DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

APG is a 72,500-acre U.S. Army installation located in southern Harford County and southeastern Baltimore County, Maryland, on the western shore of the upper Chesapeake Bay (Fig. 1).

The installation is bordered to the east and south by the Chesapeake Bay; to the west by Gunpowder Falls State Park, the Crane Power Plant, and residential areas; and to the north by the towns of Edgewood, Joppa, Magnolia, Perryman, and Aberdeen. The Bush River divides APG into two main areas: the Edgewood Area of APG lies to the west of the river and the Aberdeen Area lies to the east.

The Edgewood Area is listed on the National Priorities List (NPL). The NPL is EPA's list of hazardous waste sites in the United States that are considered priorities for long-term remedial evaluation and response.

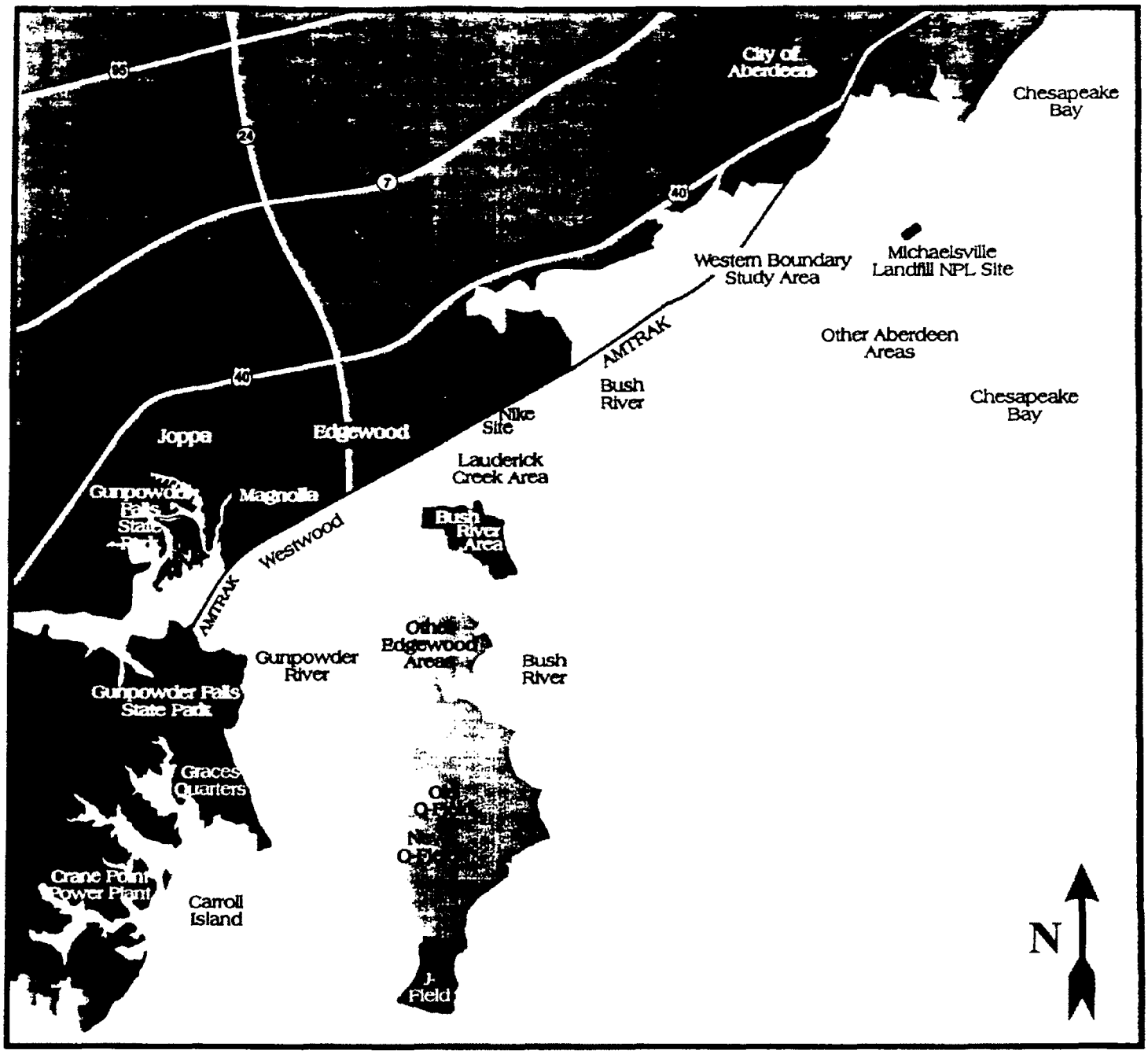
The U.S. Army Environmental Center Defense Sites Environmental Restoration Tracking System (DSERTS) identifies the 13 study areas at Aberdeen Proving Ground. The clusters, operable units, and/or subdivided areas within each of the study areas are assigned individual DSERTS numbers.

The OBRRD is DSERTS #EABR03-A as stated in the *U.S. Army Garrison, APG, Installation Restoration Plan, Action Plan, Final, March 1998.*

The Bush River Study Area (BRSA) is divided into three areas: Northern Bush River, Southern Bush River, and Cluster 3. Cluster 3 is located in the westernmost portion of the study area north of Bush River Road (Fig. 2). Cluster 3 includes two sites: the Old Bush River Road Dump (OBRRD) (Site 3) and the Transformer Storage Area (Site 23), and consists of approximately 20% secondary-growth upland forest, 29% grassy fields, 1% wetlands areas, and 50% developed areas.

The OBRRD lies in the northeastern portion of Cluster 3 within a drainage area west-southwest of Lauderick Creek. The majority of the OBRRD consists of secondary-growth trees, grass, and shrubs. Perennial streams border the northern and eastern edges of the OBRRD and drain northeast into the Lauderick Creek wetland area. These streams support nontidal wetlands according to the wetlands delineation conducted at the site. These are freshwater wetlands located above the reach of the highest tide. The wetlands are continuous along the ditches and into Lauderick Creek. This wetland area is classified as estuarine, intertidal, emergent wetlands, which drain into an upper branch of Lauderick Creek (U.S. Fish and Wildlife Service 1981).

Five deep geotechnical borings drilled in BRSA indicate there are three distinguishable aquifers separated by confining units. The three aquifers are the surficial aquifer. the Canal Creek Aquifer, and the lower confined aquifer (APG 1997a). The surficial aquifer thins and appears intermittently in this area and does not exist beneath the OBRRD. A confining layer composed of silts and clays separates the Canal Creek Aquifer and the water-bearing units above it. The confining laver is continuous beneath the OBRRD.



Installation Restoration Program Edgewood Area Location Map

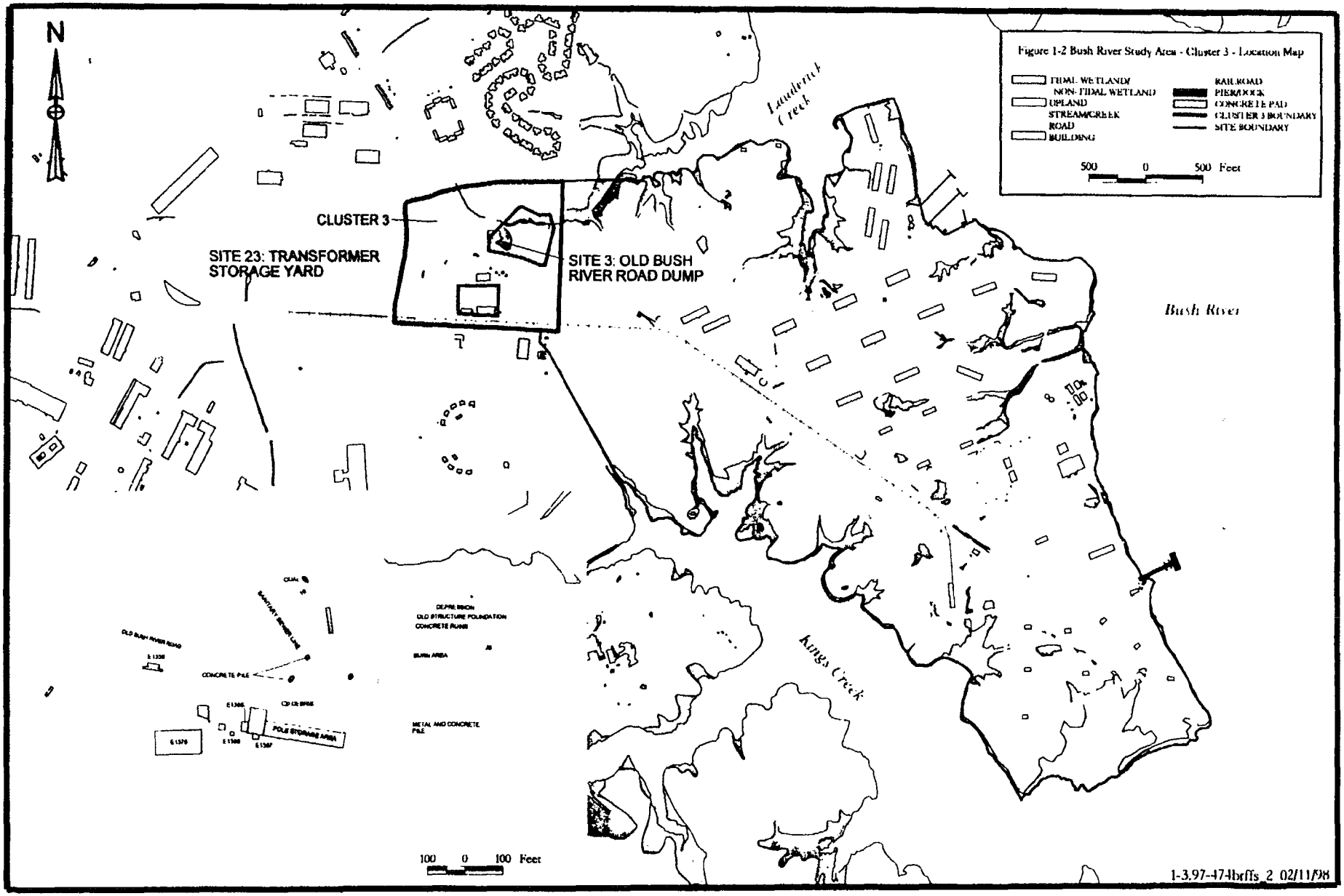

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Figure 1-2 Bush River Study Area - Cluster 3 - Location Map
TIDAL WETLAND/
NON-TIDAL WETLAND
UPLAND
STREAM/CREEK
ROAD
BUILDING
RAILROAD
PIER/DOCK
CONCRETE PAD
CLUSTER 3 BOUNDARY
SITE BOUNDARY
500 0 500 Feet
CLUSTER 3
SITE 23: TRANSFORMER STORAGE YARD
SITE 3: OLD BUSH RIVER ROAD DUMP
Laudenet Creek
Bush River
Kings Creek
DEPRESSION
OLD STRUCTURE FOUNDATION
CONCRETE RUBBLE
BURN AREA
METAL AND CONCRETE PILE
CONCRETE PILE
POLE STORAGE AREA
100 0 100 Feet
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Figure 2
5

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 Site History

The Bush River Study Area (BRSA) covers approximately 500 acres on a peninsula located in the northeast portion of the Edgewood Area and is bounded on the north by Lauderick Creek, on the east and south by Bush River, and on the southwest by Kings Creek. As early as 1918, portions of the BRSA were used for training, test activities, chemical storage, and waste disposal. The southern part of the peninsula was designated as "A-Field" and was used for artillery firing, training, testing, and for smoke and incendiary munitions testing. It is not known if there was a munition impact area in the BRSA. During World Wars I and II, the area was a main storage and transshipment depot for chemical-filled munitions. The large dock on the southeastern boundary received foreign chemical munitions that were captured in Europe and shipped to the Edgewood Area for testing and disposal. Dredging materials from the dock channel were deposited onto a southern parcel of the peninsula (USAEHA 1989).

The OBRRD predates World War II and may have existed before 1917, when the Edgewood Area became government property. A U.S. Geological Survey topography map from 1915 indicates a former home site was located near the present location. There is no historic documentation on what was disposed of at the site. Aerial photographs indicate the OBRRD was active in 1929 and continued to be active through the early 1940s (USAEHA 1989). Inspections reveal that wastes were pushed out toward Lauderick Creek over time, not all wastes were covered. and burning occurred at the site. The site is currently inactive; according to aerial photographic evaluations, disposal activities last occurred during the mid 1940s.

2.2.2 Enforcement

From 1984 to 1985, APG was evaluated as a potential National Priorities List (NPL) site under CERCLA (USEPA 1985). In 1985, the Edgewood Area of APG was proposed for inclusion on the NPL; it was listed on the NPL in 1990. In 1986, between the time of the proposed listing and the final listing, a Resource Conservation and Recovery Act (RCRA) corrective action permit (MD3-21-002-1355) was issued by the USEPA Region III to address solid waste management units (SWMUs) in the Edgewood and Aberdeen Area of APG. As part of the RCRA permit, U.S. Army Environmental Hygiene Agency (USAEHA) performed a RCRA Facility Assessment (RFA) study for the Edgewood Area. In addition to the RFA, the RCRA permit required that a RCRA Facility Investigation (RFI) be performed. However, because of the final listing of the Edgewood Area on the NPL in 1990, the RFI was not completed. Further investigations were to be performed under CERCLA.

After the Edgewood Area was placed on the NPL, a Remedial Investigation (RI) was initiated at Cluster 3. The Remedial Investigation recommended a Feasibility Study be conducted to evaluate potential remedial alternatives for the Old Bush River Road Dump (Site 3).

The following documents provide details of the site investizations and cleanup actions at Cluster 3:

- USAEHA, 1989. RCRA *Facility Assessment Report, Edgevood Area. Aberdeen Proving Ground. Maryland,* Report No. 39-26-0490-90.

- APG, 1996. *Bush River Study Area Wetlands Delineation Report, Aberdeen Proving Ground, Maryland,* September 1996.
- APG, 1998. *Remedial Investigation Report, Bush River Study Area, Cluster 3, Aberdeen Proving Ground, Maryland,* July 1998.
- APG, 1997. *Focused Feasibility Study Data Report. Cluster 3. Site 3, Bush River Study Area, Aberdeen Proving Ground, Maryland,* April 1997.
- APG, 1997*, Focused Feasibility Study Data Report Addendum for Cluster 3, Site 3, Bush River Study Area, Aberdeen Proving Ground, Maryland,* October 1997.
- APG, 1998. *Feasibility Study, Cluster 3, Old Bush River Road Dump, Bush River Study Area, Aberdeen Proving Ground, Maryland,* July 1998.
- APG, 1998, *Proposed Planfor Cluster 3, Site 3, Old Bush River Road Dump, Bush River Study Area Aberdeen Proving Ground, Maryland,* July 1998.

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

APG currently has a Restoration Advisory Board (RAB) that consists of representatives from local government agencies, businesses, and the community groups playing an active role in the Installation Restoration Program (IRP) process. One active group represented on the RAB is the Aberdeen Proving Ground Superfund Citizens Coalition. The RAB meets monthly to discuss and concur on a variety of topics regarding the environmental program at APG. The RAB has the opportunity to review and comment on all documents addressing the IRP sites. APG offered opportunities for public input and community participation during the RI, Feasibility Study (FS) and Proposed Plan for Cluster 3, Site 3, Old Bush River Road Dump. The Proposed Plan was made available in the Administrative Record, which was housed in public facilities off the APG installation. The notice of availability of the Proposed Plan was published in *The Aegis* (Harford County local paper), the *Kent County News* (Kent County local papers), *The Avenue* and *The Essex Times* (Baltimore County local paper), and the *Cecil Whig* (Cecil County local paper) on July 29, 1998, and in the *APG News* (installation newspaper) on July 30, 1998. A public comment period was held from July 31 through September 14, 1998. APG held a public meeting on August 18, 1998, at 6:30 p.m. at the Edgewood Senior Center. Edgewood, Maryland, to discuss the investigation activities that occurred at the Old Bush River Road Dump. Representatives from the USEPA, MDE, and APG were present to answer questions about APG, OBRRD, and the recommended alternative.

A summary of questions and responses from the public meeting is included in the Responsiveness Summary (Section 3). These community participation activities fulfill the requirements of Section 113(k)(2)(B)(I-v) and 117(a)(2) of CERCLA.

2.4 SCOPE AND ROLE OF THE OLD BUSH RIVER ROAD DUMP OPERABLE UNIT

This ROD documents the selected remedy for surface soil, surface water, and sediment, at the OBRRD.The OBRRD represents one component of a comprehensive environmental investigation and cleanup being performed under the IRP at APG. Protectiveness of this action will be evaluated during the five-year review process. Long-term monitoring data will be available for those reviews.

The purpose of the remedial action is to prevent future environmental impacts as a result of the migration of contaminants to areas where humans and environmental receptors may be exposed.

A study of groundwater in the BRSA is ongoing. Groundwater contamination is not addressed in this ROD. Subsequent actions will evaluate the risks and need for action based on groundwater contamination.

2.5 SITE CHARACTERISTICS

The Cluster 3 RI report investigated 2 sites: the OBRRD (Site 3) and the Transformer Storage Area (Site 23). The RI concluded that there would be no further action for the surficial aquifer, since it meets the requirements of Type III aquifer under the Code of Maryland Regulations, and cannot be considered a potential potable water supply. Also, there would be no further action at the Transformer Storage Area, a removal action was completed in 1991. However, it did recommend a Feasibility Study for the Old Bush River Road Dump.

The OBRRD is approximately 1.56 acres. The site contains many areas where surface debris is either uncovered or partially covered. There is no documentation on the types of wastes placed into the Old Bush River Road Dump. However, there is potential for hazardous materials. Lead contaminated soil; discarded laboratory supplies and glassware; recovered UXO; chemical plant process equipment; burned remnants of gas mask canisters; concrete pieces and bricks: metal objects, rods, wire, and pipes; as well as other demolition and household waste have been found at the site. The types of UXO which were used during this era and may have been disposed of in the dump include 75 mm shells, Livens projectors, and 4.2 inch mortar rounds.

The Army completed a removal action involving the placement of a fence around the OBRRD in May of 1996.

2.5.1 Summary of Site Surface Water Characteristics

Fourteen surface water samples (seven locations in two rounds) were collected during the field investigations. Only two samples had exceedences above the Fresh Acute Water Quality Criteria (FAWQC). The FAWQC was used to evaluate the groundwater's potential impact on surface water. The two samples had exceedences of lead (94.3 and 115 µg/L) just above the FAWQC of 82 µg/L.

2.5.2 Summary of Site Sediment Characteristics

Sediment samples were compared to USEPA Biological Technical Assessment Group (BTAG) screening criteria for sediment, which are based on ecological risk values. Sediment samples showed elevated levels of lead (484 mg/kg), nickel (125 mg/kg), and zinc (669 mg/kg) relative to BTAG criteria. Six sample had concentrations of beryllium (up to 5.8 mg/kg) which where above the human health screening criteria (0.150 mg/kg) [EPA Region III Risk Based Concentrations residential (RBCs)]. The elevated levels of metal in the sediment are the same metals that are present on top of the landfill and the northeastern pushout area.Therefore, it appears the sediment contamination has come from past or continuing slumping and erosion of the surface of the OBRRD.

2.5.3 Summary of Site Soil Characteristics

Two out of seven soil samples had concentrations (4,700 and 3,120 mg/kg) above the EPA ecological screening level for lead (400 mg/kg). These samples were taken from the burn areas on the landfill. The surface soils on the OBRRD contain elevated levels of metals compared to samples adjacent to the Dump. Metals such as copper (13,600 mg/kg), nickel (42mg/kg), zinc (669 mg/kg), mercury, and arsenic (49.2 mg/kg) have been found at elevated levels on the landfill. However, these levels of contamination are below industrial risk based screening criteria.

The burn areas are sparsely vegetated, and the soil in these areas is discolored. Elevated levels of lead (484 mg/kg) were found in a soil sample near a burn area. Lead was also found in soil samples taken from the burn areas (4,700 and 3,120 mg/kg). It also appears that erosion and soil slumping in this area have transported contaminated soil and sediment from the landfill into the streams and wetlands.

2.5.4 SUMMARY OF GROUNDWATER CHARACTERISTICS

Five deep geotechnical borings drilled in BRSA indicate there are three distinguishable aquifers separated by confining units. The three aquifers are the surficial aquifer. the Canal Creek Aquifer, and the lower confined aquifer (APG 1997). Wells and borings drilled in Cluster 3 show that a water-bearing fill zone exists within the northeast portion of the OBRRD and along the two perennial streams bordering the Dump. The surficial aquifer thins and appears intermittently in this area. The Canal Creek Aquifer is under confined conditions. In the vicinity of the Dump, the aquifer dips to the east. It is encountered at elevations around -2 to -13 ft mean sea level (MSL). It varies in thickness from 5 to 20 ft The Canal Creek Aquifer outcrops and is recharged west of the Dump. Groundwater flow in the Canal Creek Aquifer is to the northeast. A confining layer composed of slits and clays separates the Canal Creek Aquifer and the water-bearing units above. The confining layer is continuous beneath the Dump. The confining layer varies in thickness from 2 to 30 ft. Any contamination migrating downward is contained in the fill zone and cannot enter the underlying aquifers. Groundwater contamination in the Bush River Area is being addressed in a separate Operable Unit and is not addressed in this ROD.

2.6 SUMMARY OF SITE RISKS

APG conducted a human health and ecological risk assessment as part of the RI to estimate the probability and magnitude of potential adverse human health effect and environmental effects from contaminants at the site.

2.6.1 Human Health Risk

The human health risk assessment evaluated each contaminant detected in the groundwater, surface water, soil, and sediment samples collected during the RI and the Feasibility Study (FS). The contaminant concentrations were compared to the EPA RBCs and background concentrations. Contaminants above screening criteria were evaluated in the risk assessment.

The human health risk assessment evaluated eight contaminants of concern The contaminant of concern identified in groundwater samples was cadmium. The contaminants of concern identified in soil samples

were benzo(a)pyrene (a semivolatile organic compound). 4.4'-DDT, arsenic, copper, iron, beryllium, antimony, lead, p-chlorophenylmethyl sulfone and 2-hexone, RBC Beryllium, iron, 4,4'-DDT, arsenic, copper, iron, benzo(a)pyrene, beryllium, chlordane, 2-methylnaphthlene, phenanthrene, lead, magnesium, and antimony were identified as contaminants of concern in the sediment. Arsenic was identified in surface water. See the FS for more information on contaminants of concern (Section 1.3.3.2, page 1-16).

Health risk levels, determined using EPA guidance to ensure that conservative estimates of potential health effects are determined, differ depending on the assumed land use because human exposures differ with land use. A conservative estimate of risk was developed incorporating the potential exposure pathways and includes ingestion and dermal absorption of the affected media.

The human health risk assessment concluded the conservative estimate of potential carcinogenic risk of each chemical detected at Cluster 3 was below $1 \times l0^{-6}$ which falls within EPA's acceptable risk range. In addition, the hazard indices for each exposure pathway at the OBRRD were less than one. The OBRRD property is in an industrial area, however there is military residential housing north of the OBRRD. A review of historical information and recent UXO surveys indicates that detonation of a 4.2-in. chemical mortar located at the existing ground surface is the worst case scenario for risk to human health. The risk assessment considered the proximity of the residential property to the landfill. The selected remedial actions will be protective of the residents.

2.6.2 Ecological Risk

An ecological risk assessment was performed to assess potential adverse effects from Cluster 3 to ecological receptors. Absolute conclusions cannot be made regarding the potential for chemicals at Cluster 3 to adversely affect ecological resources because of the many uncertainties surrounding the estimates of toxicity and exposure. However, several general conclusions were made regarding the potential for adverse effects to ecological resources.

The results of the sediment analysis indicate the greatest potential for adverse effects to the benthic organisms are likely posed by the creek sediments in the freshwater marsh. The results of the surface water analysis indicate a limited potential for adverse effects to aquatic life from the surface water of the creek in the freshwater marsh.

The analytes noted to exceed ecological criteria include DDD, lead, and nickel, which were characterized as having the greatest potential for adverse effects to benthic organisms in the RI Ecological Risk Assessment.

2.7 REMEDIATION OBJECTIVES AND DESCRIPTION OF ALTERNATIVES

Remedial action objectives (RAOs) developed for the OBRRD are to:

- prevent direct contact with the Dump's soil and waste,
- reduce infiltration into the Dump and possible migration of contamination,
- prevent erosion of surface soil from the Dump to surface water and sediment
- contain any potential risk of detonation of unexploded ordnance by providing a physical barrier to the release of either chemicals or fragmentation, and

- a reduce/ eliminate risk to ecological receptors.

The EPA's Presumptive Remedy for CERCLA Municipal/Military Landfills was used in developing remedial action alternatives. The presumptive remedy process involves streamlining the FS to analyze only containment options and no-action alternative. Several remedial action alternatives were developed from the general response action of containment. The following remedial action alternatives were developed:

ALTERNATIVE 1: No Action

Annual O&M Cost	$17,162
Present Worth	$328,323

CERCLA, as amended, and the National Contingency Plan require that the "no action" altemative be evaluated at every site to establish a baseline for comparison. Remedial action is not included as part of the "no action" scenario; however, long-term monitoring will be included to determine if contaminants migrate from the landfill.

ALTERNATIVE 2: Composite Cap

Capital Cost	$1,257,628
Annual O&M Cost	$23,222
Present Worth	$1,701,884

The purpose of the composite cap is to prevent infiltration by layering geosynthetic material to drain water off the OBRRD, prevent infiltration through the composite layers, vent gases produced from the OBRRD, and contain any potential risk of detonation of a buried 4.2 inch chemical mortar. This type of cap is commonly used for municipal and hazardous waste landfills. A combination of a low-permeability geosynthetic clay layer and a flexible geomembrane would be installed as a highly effective means of reducing the potential for infiltration of water into the OBRRD, thereby reducing the possibility of contaminant migration.

ALTERNATIVE 3: Soil Cap

Capital Cost	$881,856
Annual O&M Cost	$21,782
Present Worth	$1,298,564

The purpose of the soil cap is to reduce infiltration, stabilize the OBRRD to prevent erosion of surface soil, and contain any potential risk of detonation of a buried 4.2 inch chemical mortar. A vegetative cover is established to minimize erosion, enhance evapotranspiration, and minimize infiltration. Establishing and maintaining a good vegetative cover is important in the performance of this alternative.

ALTERNATIVE 4: Vegetative Barrier Cap

Capital Cost	$819,236
Annual O&M Cost	$19,652 to $54,963 (varies by year)

Present Worth $1,308,699

The vegetative barrier cap, in conjunction with a soil cap, is an innovative technology used for landfill closure. This technology uses selected trees or grasses to further reduce infiltration into the OBRRD through transpiration. Although trees and certain grasses can increase the surface roughness of a landfill and thus increase infiltration, the transpiration rates should compensate for the added amount of infiltration entering the surface of the OBRRD. This technology uses alternative vegetation such as poplar trees and grasses to prevent precipitation from percolating beyond the root zone. This alternative will also contain any potential risk of detonation of a 4.2 inch. chemical mortar round.

2.8 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The remedial alternatives presented in Section 2.7 were evaluated in accordance with the regulatory requirements of CERCLA using the nine criteria specified by USEPA as set forth in the NCP. The nine criteria are categorized into three groups: threshold criteria. primary balancing criteria, and modifying criteria. The alternative that is ultimately implemented must satisfy the threshold criteria, which are the most important. Primary balancing criteria weight the major trade-offs among alternatives. Modifying criteria are considered after conclusion of the public comment period. This section summarizes the relative importance of each remedial alternative with respect to these criteria. Table 1 presents a comparison of remedial action alternatives for the OBRRD.

2.8.1 Threshold Criteria

- **Overall Protection of Human Health and the Environment**. All of the alternatives except Alternative 1 (No Action) provide long-term protection of human health and the environment. Alternative 4, Vegetative Barrier Cap, is an innovative technology used specifically to prevent infiltration of precipitation into the Dump's material using vegetation, specifically poplar trees. Although this is not a proven technology, the vegetative barrier is a variation of Alternative 3, Soil Cap. Existing information on poplar trees suggests that this technology would be effective long term and provide protection to human health and the environment. The vegetative barrier cap has the fewest short-term impacts during construction. The composite cap and soil cap require consolidation of waste in the northeast portion of the landfill, whereas the vegetative barrier cap does not. The possibility of UXO presents problems in conducting intrusive work in and around the Dump and creates short-term risks to workers. The composite cap also requires grubbing of trees and woody vegetation to prepare the surface of the landfill. This also creates more short-term risks to workers. The soil cap and vegetative cap do not require grubbing. Existing wetlands will be destroyed with all three alternatives. However, wetlands will be reestablished to offset long-term impacts. All the alternatives except Alternative 1 (No Action) meet all ARARs, Alternatives 2, 3, and 4 meet RAOs for the Dump. These three alternatives (1) prevent exposure to the Dump, (2) reduce infiltration and subsequent contaminant migration, (3) prevent erosion of surface soil and risk to ecological receptors, and (4) contain any potential risk of detonation of a UXO and prevent chemical or fragmentation release. Alternative 1, No Action, does not meet any of the RAOs and does not meet chemical specific ARARs.

Table 1. Comparison of remedial action alternatives for the Old Bush River Road Dump

Remedial alternative	Evaluation criteria						
	Overall protection of human health and the environment	**Compliance with ARARs**	**Long-term effectiveness and performance**	**Reduction of toxicity, mobility, and volume**	**Short-term effectiveness**	**Implementability**	**Cost**
Alternative 1, No Action	Does not provide adequate protection; ARARs are not met; RAOs are not met	Will not meet	Risks are not reduced	No reduction of toxicity, mobility, or volume	No impacts to workers or community; no reduction of risk in short-term	Easily implemented, installation of monitoring wells	Long-term Monitoring O&M: $328,323 NPW:$328,323
Alternative 2, Composite Cap	High level of protection; possibility of more short-term impacts than other alternatives; meets ARARs and RAOs	Will meet	High degree of reliable long-term protection to human health and environment; commitment to O&M is required	Reduces contaminant mobility but not toxicity or volume	Greatest short-term impacts because it requires the most excavation; effective as soon as constructed	Most difficult to implement because of the use of geosynthetics; however it is a well developed technique: materials and equipment readily available	Capital: $1.257,628 O&M: $444,256 NPW: $1,701,884
Alternative 3, Soil Cap	Protective of human health and the environment, short-term impacts from excavation; meets ARARs and RAOs	Will meet	Reliable long-term protection to human health and environment; commitment to O&M is required	Reduces contaminant mobility but not toxicity or volume	Some short-term impacts from excavation; effective as soon as grassy vegetation is established	Least difficult to implement; materials and equipment readily available	Capital: $881,856 O&M: $416,707 NPW: $1,298,564
Alternative 4, Vegetative Barrier Cap	Innovative technology; performance data are not available, use of vegetation to decrease inhalation lowest short-term impacts; if effective, will meet ARARs and RAOs	Will meet	Provides long-term protection to human health and environment; high degree of O&M is required	Reduces contaminant mobility but not toxicity or volume	Fewest short-term impacts because least amount of excavation, takes longer to establish vegetation and effectiveness	Easy to implement however, more difficult to maintain, however, materials may not be ready available, high degree of O&M	Capital: $819,236 O&M: $489,463 NPW: $1,308,699

- **Compliancewith Applicable or Relevant and Appropriate Requirements.** Alternatives 2, 3, and 4 comply with all identified ARARs. Alternative I does not comply with all ARARs. Alternative 1 does not comply with chemical-specific ARARs or RCRA Hazardous Waste Landfill requirements, which set forth criteria for cover systems for solid waste landfills.

2.8.2 Primary Balancing Criteria

- **Long-termEffectiveness and Permanence.** Alternatives 2 and 3 provide reliable, long-term protection of human health and the environment. None of the alternatives provides permanence because the waste at the Dump is not treated. As discussed earlier, Alternative 4, Vegetative Barrier Cap, is an innovative technology used to prevent infiltration into the Dump's material using poplar trees and grassy vegetation. Information on poplar trees suggests they would be effective long term.

  Alternative 1, No Action, is not effective long term and is not permanent. Commitment to O&M is essential in the long-term effectiveness of these alternatives. Alternative 4, Vegetative Barrier Cap will require the most maintenance of all three alternatives.

- **Reductionof Toxicity, Mobility, and Volume.** Alternatives 2, 3, and 4 reduce contaminant mobility by reducing surface water infiltration and limiting the transport of contaminants via surface water runoff. According to the HELP Model, the composite cap prevents infiltration better than the soil cap. However, both are comparable in preventing erosion of surface soils. No reduction in toxicity or volume of landfill contaminants is achieved with any of the alternatives because the waste at the Dump is left in place. Again, the vegetative barrier cap is an innovative technology, and performance data are not available on reduction of infiltration rates. However, the technology using poplar trees suggests that infiltration will be greatly decreased and mobility would then be reduced during the growing season. Alternative 1, No Action, does not reduce toxicity, mobility, or volume.

- **Short-term Effectiveness.** The vegetative barrier cap has the fewest short-term impacts during construction. The planning stages of all three alternatives include minimizing excavation. The possibility of UXO presents problems in conducting intrusive work in and around the Dump and creates short-term risks to workers. The composite cap, soil cap, and vegetative barrier cap require consolidation of waste, which will require excavation in the northeast portion of the landfill. All three alternatives require rerouting of the streams, which involves minimal excavation. The composite cap also requires grubbing of trees and woody vegetation to prepare the surface of the landfill. This also creates more short-term risks to workers. The soil cap and vegetative cap do not require grubbing. The vegetative barrier cap may take longer to become effective than the other alternatives. As the poplar trees grow, they absorb more water; therefore, this alternative may not be as effective as the composite cap and soil cap within the first year. The composite cap and soil cap are very similar with respect to short-term effectiveness. Alternative 1 is not effective short term and has no short-term impacts to site workers.

- **Implementability.** Alternative 1, No Action, is the easiest to implement. Of the other alternatives, Alternative 3, Soil Cap, is easier to implement. Conventional construction equipment and techniques are used, and materials are readily available. The vegetative cap is easy to construct. However, because this technology is patent pending, materials may be available from only one service contractor. However, most of the work will require conventional construction equipment. The Vegetative Barrier Cap will also require the greatest amount of maintenance. The composite cap is

more difficult to implement than the other alternatives because of the use of geosynthetic materials. However, composite caps using geosynthetics have been used at many hazardous waste sites and the technique is well developed. Extreme weather conditions can delay implementation of all the alternatives, particularly Alternative 2, Composite Cap.

- Cost. Following are the costs of the alternatives from least expensive to most expensive:

Alternative 1,No Action	$328,223
Alternative 3, Soil Cap	$1,298,564
Alternative 4,Vegetative Barrier Cap	$1,308,699
Alternative 2, Composite Cap	$1,701,884

2.8.3 Modifying Criteria

- **State/Agency Acceptance.** Maryland Department of the Environment does not accept Alternative 1. Alternative 3 is acceptable because this alternative prevents direct contact with the OBRRD soil and waste, reduces infiltration into the OBRRD and possible migration of contamination, prevents erosion of surface soil, contains the detonation of buried UXO, and reduces risk to ecological receptors.

- **Community Acceptance.**The community has accepted Altemative 3 during the public comment period.

2.9 THE SELECTED REMEDY: SOIL CAP

The soil cap, is the selected remedy for remediation of the Old Bush River Road Dump. The soil cap reduces migration of contaminants by reducing infiltration, stabilizing the OBRRD to prevent erosion of surface soil, and contain the risk of detonation of a 4.2-in. chemical mortar. A review of historical information and recent UXO surveys indicates that detonation of a 4.2-in. chemical mortar located at the existing ground surface is the worst case scenario for risk to human health. The Conventional Weapons Effects Model shows that a burial depth of 3 ft is sufficient to contain the blast produced by a 4.2-in. chemical mortar. The soil cap will consist of two layers. The first layer will be a minimum 3 ft foundation layer. The second layer will be a minimum 6 inch layer of topsoil to support vegetation. Therefore, the Soil cap will be a minimum of 3 feet 6 inches. The HELP model, which is used by EPA to understand infiltration through landfill caps, shows that a soil cap with good vegetative cover will reduce infiltration of precipitation into the landfill by 76%.

Institutional controls will be implemented in the area. A 6-foot fence with warning signs will be maintained around the OBBRD to restrict access. In addition, land use, access, and excavation restrictions will be included in APG's GIS, and in APG's Real Property Master Plan. All use restrictions will be incorporated in any real property and/ or real estate documents necessary for transferring ownership from the Army, in the unlikely event that the Army transfers the property. The real property and/ or real estate documents would also include a discussion of the NPL status of the site, as well as a description of the contaminants at the site. Quarterly inspections will be performed and the Army will certify to EPA on an annual basis that the institutional controls are functioning. A site-wide LUCAP is being developed for APG, and will incorporate Cluster 3.

This alternative meets the Remedial Action Objectives of (1) preventing direct contact with the OBRRD soil and waste, (2) reducing infiltration into the OBRRD and possible migration of contamination, (3) preventing erosion of surface soil, (4) contain the risk of detonation of buried UXO, and (5) reducing risk to ecological receptors. A comprehensive monitoring plan for the site will be developed through a cooperative effort between the U. S. Army APG, USEPA, and MDE, after this ROD is finalized. The plan will approved by the USEPA and be available in the administrative record, as required by CERCLA.

2.9.1 DOCUMENTATION OF SIGNIFICANT CHANGES

There have been no significant changes since the Proposed Plan was presented.

2.9.2 PERFORMANCE STANDARDS

- The soil cap will consist of two layers. The first layer above the OBRRD surface will be a minimum 3-ft foundation soil layer designed to contain a blast of buried UXO and prevent an acute release of chemical gases. As with the composite cap, a review of historical information and recent UXO surveys indicates that a detonation of a single 4.2-in. chemical mortar located at the existing ground surface is the worst case scenario for risk to human health, since chemical munitions do not sympathetically detonate. The Conventional Weapons Effects Model shows that a burial depth of 3 ft is sufficient to contain the blast produced by a 4.2-in. chemical mortar. The soil cap, which will consist of two layers, will be a minimum of 3 feet 6 inches.

- The second (top) layer will be a minimum ½-ft-thick layer of topsoil. The cap will be thicker in someareas to bring the surface of the cap to a level grade with a 4% slope to facilitate drainage. A vegetative cover will be established to minimize erosion. enhance evapotranspiration, and minimize infiltration. Surface and subsurface wastes outside the limits of the OBRRD cap will be consolidated and placed under the cap limits

- Both adjacent streams will be filled because of their proximity to the OBRRD. The streams will be relocated around the slope of the OBRRD; the northern stream will be moved to the north and the eastern stream to the east. Both streams support emergent wetland vegetation that will be destroyed during construction. State regulations and policy on destruction of nontidal wetlands dictate that emergent wetlands must be reestablished on a minimum 1:1 basis. The area of the wetlands that will be disturbed and reestablished onsite is approximately 0.35 acres.

- Long-term monitoring will be performed for a minimum of 30 years to ensure the long-term performance of the soil cap. The cap will be inspected for erosion, subsidence, vegetation density, and any other problems that may impede performance of the soil cap. Sediments downgradient to the OBRRD will be sampled quarterly for the first year, and annually thereafter.

- Because the remedy does not allow for unrestricted future use of the site, a review will be conducted within 5 years after commencement of remedial actions to ensure adequate long-term protection of human health and the environment is maintained. At that time the need for additional 5 year reviews will be evaluated.

- Institutional controls will be implemented in the area. A 6-foot fence with warning signs will be maintained around the OBBRD to restrict access. In addition. land use, access, excavation

restrictions will be included in APG's GIS, and in APG's Real Property Master Plan. In addition, the Director of APG's Directorate of Safety, Health, and the Environment will certify to EPA on an annual basis that there have been no violations of the prohibitions. If a violation has occurred, a description of the violation and corrective actions to be taken will be provided.

2.9.3 COMPLIANCE WITH APPLICABLE OR RELEVANT APPROPRIATE REQUIREMENTS

The selected remedy meets or exceeds all ARARs. The specific ARARs are listed in Table 2: Description of ARARs for Selected Remedy.

Table 2 Description of ARARs for selected Remedy				
Media	**Require ment**	**Synopsis of Requirement**	**Action to be taken to Attain Requirement**	**Status**
Ground Water	Chemical And Action	Federal Clean Water Act 40 CFR Part 131 Water Quality Standards	The objectives of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity Of the nation's water. This objective is achieved through The control of discharges of pollutants to navigable waters. This control is implemented through the application of federal, state, and local discharge standards. CERCLA § 121 states that hazardous substances, pollutants, or contaminants left on-site at the conclusion of the remedial action shall attain federal water quality criteria. Water quality criteria are based on the potential use of the stream. Therefore, FAWC are applicable for clean up standards for the streams near the Dump.	Applicable
Ground Water	Chemical	Maryland Water Quality COMAR 26.08.02.01-08	Maryland water quality regulations designate uses of the waters of the state and establish water quality standards to protect the designated uses. This regulation is applicable and will be met by constructing a soil cap on the Dump minimizing the potential for leachate to degrade surface water.	Applicable
Hazardous Waste	Location	Maryland Natural Resources Code annotated Sections 8.1801 to 8.1816	Because Site 3 is within the l.000-ft buffer of the Chesapeake Bay known as the Critical Area, activities are subject to natural resource protection standards and restrictions, which require the implementation of storm water runoff control devices and other impact reviews and controls. Storm water and sediment controls will be implemented to meet the requirements of this regulation.	Applicable
Ground Water	Action	Changes in Stream Channels or Floodplains COMAR 26.04.07	Permits are not required for CERCLA actions. However, the substantive requirements of the regulation must be followed; therefore, this regulation is *applicable*.	Applicable
Ground Water	Action	Maryland Standards for Groundwater Monitoring and Protection COMAR 26.13.05.06	Applies to owners and operators of permitted hazardous waste facilities, including landfills, for groundwater monitoring and protection . This regulation addresses general groundwater monitoring requirements, concentration limits, and compliance points. The Dump is not a permitted facility; however, the monitoring requirements are relevant and appropriate to the situation at the site. A groundwater monitoring system will be implemented to determine if migration is occurring from the landfill.	Relevant And Appropria te

Table 2 Description of ARARs for Selected Remedy cont.				
Media	**Require ment**	**Synopsis of Requirement**	**Action to be taken to Attain Requirement**	**Status**
Ground Water and Soil	Action	U.S. Army Corps of Engineers [33OSC1341 Certification] 33 CFR Part 323	Although a permit is not required because this is a CERCLA site, the substantive requirement must be followed. Capping procedures must follow requirements for wetland protection or implement engineering controls to minimize or prevent adverse impacts.	Applicable
Ground Water and Soil	Action	Nontidal Wetlands COMAR 26.23.01-.05	Although a permit is not required because this is a CERCLA site, the substantive requirement must be followed. State policy on the destruction of wetlands requires that emergent wetlands must be mitigated on a 1:1 basis.	Applicable
Ground Water and Soil	Action	Clean Water Act Section 404 National Wide Permits	Permits are not required for CERCLA actions. However, the substantive requirements of the regulation must be followed.	Applicable
Hazardous Waste	Action	Munitions Rule 40 CFR 264,300	After a munition is determined to be a solid waste, the regulations establish if it is also a hazardous waste. White phosphorous was found in a munition in the Dump. White phosphorous is considered a RCRA hazardous waste because it is highly reactive.	Applicable
Soil	Action	Maryland Erosion and Sediment Control COMAR 26.09.01	Requires a erosion and sediment control plan to be in place for any federal project unless the project involves less than 100 cubic yards of grading of 5,000 square feet of grading. An erosion and sediment and control plan will be implemented.	Applicable
Air	Action	Maryland air Quality regulations COMAR 26.11.01-26.11.02.21	Dust Suppression techniques will be used to minimize the airborne transport of contaminated dust in compliance with this regulation.	Applicable
Ground Water and Soil	Action	Maryland Regulations for Well Drillers COMAR 26.05	Applicable to the abandonment of monitoring wells within the limits of the cap.	Applicable

.Table 2 Description of ARARs for Selected remedy cont.				
Media	**Require ment**	**Synopsis of Requirement**	**Action to be Taken to Attain Requirement**	**Status**
Ground Water	Action	Ground water Quality Regulations COMAR 26.08.02.09	The Dump is not permitted disposal unit; potential discharges are being mitigated, and approval from the state will not be needed or required. However, the purpose of the regulation is to protect ground water and surface waters of the state; therefore, putting a soil cap on the Dump prevents migration of contaminants to surface water and comp[lies with the substantive requirements of the regulation.	Relevant and appropriate
Hazardous Waste	Action	AR 200-2 Enviromental Effects of Army Actions	Provides guidance on incorporating into CERCLA process (FSs). It implements the Council on Environmental Quality's NEPA regulations. As a matter of policy, the organization preparing the FS ensures the document complies with 40 CFR 1500-1508.	Applicable
Hazardous Waste	Action	CEQ NEPA Regulations 40 CFR 1500-1508	This regulation will be complied with by implementing AR 200-2	Relevant and Appropriate
Hazardous Waste	Location	Fish and Wildlife Coordination Act (50 CFR Part 402 Interagency Cooperation-Endangered Species Act of 1973, as amended)	No Bald Eagles nests are currently within 500 meters of Cluster 3; applicable if there are possible impacts to threatened or endangered species.	Applicable
Hazardous Waste	Location	Federal Conservation of Wildlife Resources 50 CFR Part 402 (Endangered Species Act)	No endangered species are believed to be within 500 meters of Cluster 3. Applicable if there are possible impacts to threatened or endangered species.	Applicable
Hazardous Waste	Location	Maryland Threatened and Endangered Species Regulations COMAR 08.03.08	The Bald Eagle is believed to forage in and around the study area. However, no nest sites are currently within 500 meters of Cluster 3. Construction activities are not anticipated to impact the bald eagle: *applicable* if there are possible impacts to threatened or endangered species.	Applicable

3.0 RESPONSIVENESS SUMMARY

The final component of the Record of Decision is the Responsiveness Summary. The purpose of the Responsiveness Summary is to provide a summary of the public's comments, concerns, and questions about the Old Bush River Road Dump Site and the Army's responses to these concerns.

During the public comment period, written comments were received by APG.

APG held a public meeting on August 18, 1998, to formally present the Proposed Plan and to answer questions and receive comments. The transcript of this meeting is part of the administrative record for the site. The Army and EPA have considered all comments and concerns summarized below in selecting the cleanup method for the Old Bush River Road Dump Site.

This responsiveness summary is divided into the following sections:

3.1 Overview.
3.2 Background on community involvement.
3.3 Summary of comments received during the public comment period and APG's responses.
3.4 Sample newspaper notice announcing the public comment period and the public meeting.

3.1 OVERVIEW

At the time of the public comment period, the Army had endorsed a preferred alternative for the Old Bush River Road Dump Site. APG proposed a soil cap and long-term monitoring. EPA concurred that the soil cap would provide adequate protection for this site. EPA also indicated they would need to work with the state to address appropriate state regulations. MDE generally supported the Army's preferred alternative but stated it would finalize its position after reviewing public comments. MDE has concurred with the selected alternative.

The community agrees with the concept of capping. Some concerns have been expressed about the type of cap and the impact of environmental investigations ongoing at adjacent areas. APG has addressed these questions and concerns below and will continue to work with the on-post and off-post communities to address their concerns.

3.2 BACKGROUND ON COMMUNITY INVOLVEMENT

Citizens' interest in the Bush River Study Area has been expressed at Restoration Advisory Board meetings and through comments by the APG Superfund Citizens Coalition. Also, there has been some interest from military housing residents near the northern portion of the study area.

APG has maintained an active public involvement and information program. Highlights of the community's involvement in the site and APG's activities during the last two years follow:

- APG began discussing the history of the Bush River Study Area and environmental investigations with the Restoration Advisory Board in February 1995. In August 1995, APG discussed the Focused Feasibility Study being started for the Old Bush River Road Dump Site.

The Board further discussed the site at the December 1996 and August 1997 meetings. In August 1998, APG repeated the Proposed Plan briefing given at the public meeting on August 18 at the Board meeting.

- APG released the Proposed Plan for the Old Bush River Road Dump Site for public comment on July 31, 1998. Copies were available to the public at APG's information repositories at the Aberdeen and Edgewood Branches of Harford County Library, and Miller Library at Washington College. A copy of the Proposed Plan also was posted on the Installation Restoration Program's Web Site, and the public was invited to comment through the Web Site.

- APG prepared a release for the APG News announcing the availability of the Proposed Plan, the dates of the public comment period, and the date and time of the public meeting.

- A 45-day public comment period on the Proposed Plan ran from July 31 to September 14, 1998.

- APG placed newspaper advertisements announcing the public comment period and public meeting in The Aegis, the Cecil Whig, The Avenue, the Essex Times, and the Kent County News.

- APG prepared and published a fact sheet on the Proposed Plan. APG mailed copies of this fact sheet to over 2,650 citizens and elected officials on its Installation Restoration Program mailing list. The fact sheet included a form which citizens could use to send APG their comments.

- On August 18, 1998, APG held a public meeting at the Edgewood Senior Center, Edgewood, Maryland. Representatives of the Army, EPA, and the MDE presented information on the site and their respective positions on the proposed cleanup alternatives.

3.3 SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES

Comments raised during the Old Bush River Road Dump Site public comment period on the Feasibility Study and the Proposed Plan are summarized below. The comments are categorized by source.

COMMENTS FROM QUESTIONNAIRE INCLUDED WITH FACT SHEET

As part of its fact sheet on the Proposed Plan, APG included a questionnaire that residents could return with their comments. APG received 10 completed returns. The alternatives preferred by individuals returning comment forms were:

0 Alternative No. 1 - Take No Action.
1 Alternative No. 2 - Composite Cap.
6 Alternative No. 3 - Soil Cap (see comments 1 and 2 below).
1 Alternative No. 4 - Vegetative Barrier Cap (see comment 3 below).
2 Have no preference.

Written comments included on the form are summarized below.

Comment No. 1: "An excellent, thorough report."

Response No. 1: APG acknowledges and appreciates the feedback.

Comment No. 2: "If No. 3 does not comply with landfill regulations, then take alternative No. 1."

Response No. 2: The selected alternative complies with all State ARARs. See comments from Maryland Department of the Environment at the end of this Responsiveness Summary.

Comment No. 3: "If I understood correctly, No. 3 would require removal of trees and woody vegetation, same as No. 2. 1 therefore chose #4."

Response No. 3: All of the alternatives would require the removal of some vegetation. Alternative 4, the vegetative barrier cap, would be used in conjunction with a soil barrier cap and thus vegetation would need to be removed. The purpose of the vegetative barrier cap would be to further reduce infiltration into the site through transpiration. However, this is a new technology and may take longer to become effective as compared to the other technologies. Therefore, APG and EPA selected Alternative No. 3.

COMMENTS FROM RESTORATION ADVISORY BOARD MEMBERS

As part of its efforts to involve the public in decisions as early as possible, APG provided Restoration Advisory Board members with a draft of the Proposed Plan and a final version of the Proposed Plan.
Preferred alternatives and comments from Board members are summarized below.

0 Alternative No. 1 - Take No Action.
1 Alternative No. 2 - Composite Cap.
4 Alternative No. 3 - Soil Cap.
0 Alternative No. 4 - Vegetative Barrier Cap.
1 Alternative No. 3/Alternative No. 4 (see comment no. 5 below)

Comment No. 4: "My only concern is that when work begins on the cap, dust and any other sources of potential transmission of existing surface contaminants be kept to a level which is safe. Safe because the work will occur in close proximity to family housing."

Response No. 4: APG agrees with this comment and will take appropriate dust control and sediment and erosion control measures during the construction.

Comment No. 5: "Report does not state why Alternative 3 (soil cap) was chosen. According to the report, the vegetative cap has many advantages with the only disadvantage being limit of contractor and amount of maintenance. You might want to explain APG and MDE's reason for choice."

Response No. 5: The vegetative cap is also lacking in performance data for both short-term and long-term implementation. For this reason, APG and EPA selected the soil cap. The soil cap is easier to implement and maintain, will be protective of human health and the environment, and is cost effective.

Comment No. 6: "This alternative [alternative no. 3] seems to be the most cost-effective option."

Response No. 6: APG agrees that Alternative 3 is a cost-effective option. While protection of human health and the environment is the most important criteria, the effective use of taxpayers' resources is a criteria APG is required to consider.

Comment No. 7: "Since the true components of the landfill cannot be determined, there is at least one exceedence, and the groundwater (water-bearing zone is hydraulically connected to the headwaters of Lauderick Creek, I recommend the composite cap to ensure future leaching into the groundwater does not occur. The added cost of $400,000 for the low-permeable cap is money well spent if it keeps metals from entering the Bay. As the report admits, dealing with unknowns of the landfill, the plan should take a more conservative approach."

Response No. 7: APG agrees protection of the Bay and other surface water bodies is important. Our environmental sampling downgradient of the site found little evidence of contamination, except from the erosion of the existing landfill surface soil. The proposed soil cap will prevent further erosion and mitigate the possibility of movement of metals in the Bay. In addition, APG will implement a long-term monitoring program that includes sampling and bioassays to ensure the soil cover is functioning properly and continues to be protective.

COMMENTS AT THE AUGUST 18, 1998 PUBLIC MEETING

A full transcript of the public meeting is at APG's information repositories. Following is a summary of verbal cornments made at the meeting. (Several comments made by a consultant to APGSCC at the public meeting are addressed in the section which includes all of APGSCC's comments.)

Comment No. 8: A representative from Harford County Division of Environmental Affairs asked why a single membrane cap or similar design was not considered. He also asked about the potential for lateral movement of substances from buried munitions along the interface between the soil cap and the underlying clay layer.

Response No. 8: In response to the first comment, the State of Maryland regulations require a double-layer cap for hazardous waste landfills. The State of Maryland has determined that the requirement for a double layer cap does not apply to the Dump. Several capping configurations were evaluated in the FS. The selected alternative meets or exceeds the requirements identified by the State.

In response to the second comment, APG did evaluate the potential for munitions to be in the landfill and to detonate. APG believes it is possible for munitions to be present but very unlikely that they would detonate. APG believes Alternative 3 will provide adequate protection of human health and the environment even in the unlikely event a munition would detonate.

OTHER WRITTEN PUBLIC COMMENTS

The following written comments were submitted from a resident:

Comment No. 9: "It appears that Alternative 3 is the most cost-effect, proactive remedial measure. I am not clear, however, as to the material to be used for the 3-foot foundation. Would this be an impermeable

material? Would this material be calcium based or enriched due to the migration of metals observed at the site leaching into ground water?

Response No. 9: The exact specifications of the cover will be contained in the remedial design which is the next step in the process. Once the design is complete, APG will send the community a fact sheet showing the exact specifications of the cover. It is anticipated the three-foot foundation will be a common borrow soil, and would not be impermeable. It is not expected that the material would be calcium enriched. A second layer of topsoil, with a minimum of ½ foot thickness, will be placed on top of the foundation layer. This layer will include a vegetative cover which will reduce infiltration of precipitation into the landfill by 76%.

Comment No. 10: The commenter noted Alternative 1 was not acceptable. He stated Alternatives 2 and 3 are the most reliable remedial approaches, with Alternative 2 being the most conservative and costing over $400,000 more to implement. He asked: "How many monitoring events would be required with each alternative to determine effectiveness and obtain closure? Will the State issue a waiver to COMAR 26.13.14 to avoid a possible NOV? Should the State stand firm with COMAR, it would be worth spending the extra $400,000. Although I believe that if the cost estimations are accurate and the general effectiveness of Alternative 3 is sufficient that the State will essentially be forcing the installation to waste federal tax dollars based on formalities and technicalities."

Response No. 10: See comments from the Maryland Department of the Environment at the end of this Responsiveness Summary.

Comment No. 11: "I do not understand why the Risk Assessment was overly conservative and included ingestion as an exposure pathway. If this aquifer of concern was determined not to be viable, then why would any other scenario outside of the "construction worker scenario" be applicable? Was ingestion included due to the proximity of the Bush River? Is there evidence that the aquifer provides base flow to the river (a good assumption). At that point, would you be considering the source of ingestion to be through fish and game that would use the river as a drinking water source? Or are there municipal water intakes located downstream? Thank you for this opportunity to comment."

Response No. 11: APG follows EPA guidance in preparing Risk Assessments; this guidance is very conservative to be protective of the public and the ecology. Under the guidance, APG looked at potential exposure pathways including ingestion by humans. The ecological risk assessment examined the potential for impact to fish and other aquatic life. The ecological risk assessment found only a limited potential for any adverse effects. APG's surface water sampling also showed only one minimally elevated detection of dissolved lead above the Federal Ambient Water Quality Criteria.

COMMENTS FROM APG SUPERFUND CITIZENS COALITION (APGSCC)

APGSCC is the recipient of Technical Assistance Grants from the U.S. Environmental Protection Agency. These grants allow APGSCC to hire consultants to help them review and comment on technical documents. Following are comments prepared by APGSCC and their consultant, the University of Maryland.

Comment No. 12: "Presenting only no action and capping alternatives for this 1.56-acre site reduces the community's ability to evaluate a reasonable spectrum of possible solutions and to concur or disagree with the selected approach. As raised by APGSCC's technical consultant at the Restoration Advisory Board meeting, an appropriate diversity of alternatives should be included in the proposed plan. While the selection of these alternatives was based on EPA's presumptive remedy for municipal and military landfills, it should be noted that *the Citizen's Guide to Understanding Presumptive Remedies* supports the community's right to request the evaluation of other alternatives."

Response No. 12: EPA's objective for presumptive remedies is to use past experience at similar sites to streamline investigations and speed up selection of cleanup actions. The use of presumptive remedies can ensure consistency in remedy selection and reduce the cost and time required to clean up similar types of sites. EPA expects presumptive remedies to be used at all appropriate sites except where site-specific circumstances suggest that either the presumptive remedy would not be appropriate, or that another remedial alternative would be clearly superior when evaluated using CERCLA remedy evaluation criteria.

As discussed in the feasibility study, EPA established source containment as the presumptive remedy for CERCLA municipal landfill sites in 1993, and in 1996 issued guidance on the application of this presumptive remedy to military landfills. The guidance presents a decision framework to use in determining if use of the presumptive remedy is appropriate. This decision framework is presented and employed in the feasibility study, and clearly indicates that the presumptive remedy, containment, is the most appropriate remedial response.

Published policy and procedures by EPA on presumptive remedies states: "The identification of a presumptive remedy does not relieve the EPA or the Army of the obligation to respond to comments suggesting that other alternatives should have been considered." The guidance further states: "... the submission of comments advocating other approaches does not necessarily require broadening of the FS or EE/CA, or conducting additional analysis after the plan has been proposed. Whether additional documentation is required will depend upon how substantial or persuasive the comments are (e.g., whether a comment identifies unusual site circumstances that seriously call into question the applicability of the presumptive remedy)." APGSCC has not identified any such site circumstances that would make the presumptive remedy inappropriate, and other alternatives do not warrant more detailed study.

Comment No. 13: "The IRP's determination that excavation is not feasible due to costs and explosive risks, as delineated at the RAB, are not conclusions that should be drawn before public comment and full discussion of the pros and cons via the RAB and the proposed plan. The presence of munition wastes has been raised as reasoning for why excavation is not a possibility. However, as APG has vigorously pointed out at other sites, no chemical warfare materiel (CWM) has actually been found at Cluster 3, and one should not automatically assume that it is present just because an empty CWM round was retrieved. Additionally, contamination has migrated from the site, as elevated contaminants have been found in Lauderick Creek. The information does not appear to definitively indicate that capping the site will improve the quality of Lauderick Creek. This site contains a push out area resulting from the clearance of past burning and dumping activities, by which wastes are pushed out into the marsh to allow additional disposal activity. At a minimum, monitoring will need to take place in the marsh and creek to evaluate the effectiveness of the proposed alternative. Ecological impacts in Lauderick Creek from current contamination levels should also be adequately evaluated. Without comprehensive exploration of unknown site characteristics, APG runs the risk of exposing unsuspecting individuals to unnecessary risks, and although this is not always avoidable, the seriousness of inadequate source evaluation and environmental fate must be given considerable weight in selecting a course of action."

Response No. 13: EPA guidance requires issues related to military-specific wastes be considered in the feasibility study, and that an evaluation be performed to determine if excavation of the waste is practical. This analysis is a fundamental element in determining the applicability of the presumptive remedy at the OBRRD and was accomplished during the feasibility study. During the public comment period, the public is encouraged to review the feasibility study. Also, members of the public may form their own opinions, suggest other alternatives, and provide feedback to the Army and EPA. The use of the presumptive remedy approach was presented at the August 1997 RAB meeting thus informing RAB members early in the process of the planned approach.

For the OBRRD, both an empty Livens projectile (the empty CWM round) and an explosively configured white phosphorus munition (4.2 inch) have been found at the site. While no rounds containing lethal chemical warfare materiel (i.e., mustard, phosgene, Lewisite, etc.) have been found, given the time period of site usage, the existence of such items at the site is possible. Munitions filled with CWM have been recovered in the Bush River Area. It also should be noted that the presence of ordnance containing explosives and white phosphorus are also a significant hazard, would make site excavation a hazardous operation.

Surface soil within the OBRRD contains lead and other constituents of concern. Without remedial action, erosion processes would result in continued release of these constituents to Lauderick Creek. The soil cover will prevent transport of constituents of concern to Lauderick Creek and also will achieve all other remedial action objectives. The effectiveness of this remedy in protecting human health and the environment is clearly stated in both the feasibility study and the proposed plan.

Monitoring of nearby Lauderick Creek sediments is planned. The work will include chemistry and bioassay with quarterly sampling events from before and after construction, with annual monitoring thereafter.

Comment No. 14: "The TAG Group strongly suggests that all future proposed plans be expanded to present more diverse alternatives to be considered. Excavation and partial excavation scenarios should be fully evaluated within the feasibility study and outlined within the proposed plan. Simply stated, the community cannot participate if only limited options are included in the document that is most likely to be read by the public."

Response No. 14: Consistent with EPA guidance and policy, APG will continue to consider presumptive remedies where appropriate. The consideration of presumptive remedies can both accelerate remedial programs as well as reduce costs, thus benefiting the public. Use of presumptive remedies does not limit community participation, and expansion of the feasibility study process to perform detailed analysis of remedial alternatives that are not practical does not expand public participation and is not an effective use of taxpayer resources.

APG intends to consider the use of presumptive remedies for the 22nd and 30th Street landfills in the Southern Bush River Study Area, as well as other similar sites. The decision to limit feasibility study work to consideration of only no action and the presumptive remedy, or to have an expanded feasibility study with consideration of a wider range of alternatives, will be made during the feasibility study scoping process with participation by APG, EPA Region III, MDE and the public. The feasibility study work at these landfill sites has been initiated and scoping will occur during calendar year 1999.

Comment No. 15: "APGSCC has long supported the characterization of contamination from a holistic perspective." "As for the risk assessment, the contamination and resulting risks at a particular site should be evaluated in conjunction with other risks from nearby contamination. Assessing the Cluster 3 contamination as it relates to adjacent sites should be done."

Response No. 15: APG agrees that that it is important to consider data from nearby study areas when evaluating contaminant transport and when assessing risk. Both a regional and local perspective must be maintained when developing an understanding of groundwater movement. A substantial amount of investigation has been accomplished in the Cluster 13 area, and data collection to support the Cluster 13 feasibility study work is ongoing. The groundwater plume from Cluster 13 does extend southward across the local branch of Lauderick Creek, but is still roughly 2000 feet from and has no potential to impact groundwater quality in the Cluster 3 and the OBRRD area. There is no use of groundwater from the Cluster 3, Cluster 13, or onpost housing areas, and because there is no exposure pathway, there is no risk to current APG workers or residents from Cluster 13 groundwater. Alternatives for remediation of groundwater in the Cluster 13 area are being analyzed as part of ongoing feasibility study work for that operable unit, and that work has no relationship to the OBRRD remedial decision process. Data from both efforts is being considered when developing an understanding of groundwater occurrence and movement in the general vicinity of Lauderick Creek.

APG agrees, when assessing risk to ecological receptors within a drainage basin, it is appropriate to consider all of the contaminated areas within the basin, and that there are potentially additive impacts of separate sources and contaminated areas. APG has been conducting ecological risk assessment work addressing large geographical areas, with the studies of the Gunpowder and Bush Rivers and their tributary creeks being examples. As monitoring and assessment work in Lauderick Creek proceeds, all data will be evaluated when assessing risk.

Data from adjacent contaminated sites has no bearing on the conclusions of the RI/FS that soil within the OBRRD contains constituents at levels that create risk to potential ecological receptors, that constituents have migrated to nearby Lauderick Creek sediments via erosion and sediment transport, and that remediation of the OBRRD as a source is necessary. Data from studies in adjacent sites is not necessary for remedial alternative selection for the OBRRD.

Comment No. 16: "The Transformer Storage Area within Cluster 3 is the other area of concern within Cluster 3 that was evaluated within the remedial investigation. The authors of the report concluded that no further action was necessary at this site. Yet, within the proposed plan, it is stated that this site is recommended for further evaluation. Chapter 6 of the remedial investigation mentions determined concentrations of metals and DDT (and degradation products) present within the cluster, and evaluated potential impacts to terrestrial plants, soil-dwelling invertebrates, small carnivorous mammals and carnivorous birds. The risk assessment supported the possibility of impacts as a result of the metals and pesticides measured, including arsenic, cadmium, mercury, nickel, lead and selenium. APG should clarify whether additional evaluation will be considered. Based on the risk assessment, additional investigation, including bioassays, seem appropriate. Sampling areas of clear concern include soil sample locations SS-04 and SS-05, where some of the highest metal concentrations were detected. SS-04 exists within the heart of Transformer Storage Area (Site 23) and SS-05 appears to be outside the landfill area to be capped. Please clarify if these areas of soil contamination were addressed during any removal action to date. If they are not, what efforts will be made to ensure that continued run-off and wind dispersion

does not add to the already elevated concentrations of some of these metals in the sediments of Lauderick Creek. Considering that this area may remain a source area, will there be any assessment of the soil between these two sampling locations to determine the extent of these particularly high areas? APGSCC requests that the community be updated on the further evaluation that is to take place according to the proposed plan, as the TAG Group cannot support no further action as recommended in the remedial investigation."

Response No. 16: Supplemental surface soil sampling is planned for the Site 23 area, within which the former transformer storage area was located. The objective of the supplemental surface soil sampling and analysis is to determine the extent of lead in surface soil at locations SS-04 and SS-05 in support of a planned removal action to address soil containing lead at greater than 200 mg/kg. Samples at SS-04 and SS-05 will also be analyzed for PCBs. Data from this supplemental soil sampling and analysis, together with data from the planned sediment monitoring and bioassay and that data already available will provide a better understanding of soil contamination and contaminated sediment transport in the vicinity of Site 23 and the OBRRD. The need for additional work to address other constituents in soil is currently under evaluation.

No soil removal actions have been accomplished at Site 23. The exact extent of the soil cover for the OBRRD has not yet been determined by the design, but it is anticipated that lead in surface soil at both SS-05 and SS-04 will be addressed by a removal action to be accomplished after the planned sampling and analysis to determine the extent of lead. APGSCC. the Restoration Advisory Board, and the public will be kept informed during the design process for the OBRRD soil cover and during the supplemental sampling and possible removal action efforts.

Comment No. 17: "With regard to Site 23, it should be mentioned that a removal action was conducted at the site to remove a concrete pad located at the site of former Building E1372, an underground storage tank and contents of a sump associated with this building. From the remedial investigation, it appears that the confirmation soil sampling confirmed that contaminated materials had been removed down to a concentration of 50 ppm. The remedial investigation indicates that the 50 ppm clean up level is a regulatory guideline for determining sites with contamination that would require management as PCB waste and/or hazardous waste. However, this the clean up conducted through this removal action does not appear necessarily to be protective of human health or the environment. The industrial risk-based concentration is 740 ppb, while the BTAG screening level for impacts to fauna is 100 ppb. The adequacy of the removal action needs to be reevaluated."

Response No. 17: The objective of the removal action was to remove contaminated structural materials and items requiring management as PCB and/or hazardous waste (concentrations exceeding 50 ppm).
The removal action was not implemented to remove all soil that might have been contaminated. The objectives of the removal action were accomplished.

Removal action sampling and analysis results were not used in quantitative risk assessment calculations or in assessing the need for further remediation at the removal action site. The supplemental soil sampling discussed above will include analysis of selected samples for PCBs.

Comment No. 18: "Significant issues remain to be addressed regarding the RAD risk assessment conducted at Cluster 3. While RESRAD was used as a screening method the support documents contain almost no information regarding the parameters used in the modeling. One section of the RI indicates that this model may have only been used to assess soil contamination. Attachment B to the risk assessment portion of the RI Report notes that the ingestion of drinking water was not considered in the RESRAD model, which brings into question the validity of the future scenario risk assessment. Were inhalation and ingestion considered in the RESRAD modeling?"

Response No. 18: During the last several years, the approach to human health risk assessment for radionuclides has evolved. The current approach at APG is consistent with the approach employed at most other facilities, including Department of Energy facilities.

The approach involves calculating risk using two methodologies. The first methodology is to simply calculate carcinogenic risk using cancer slope factors in a manner identical to that for carcinogenic chemicals, with the risk result then being compared to the EPA target range of 10^{-6} to 10^{-4} for excess lifetime cancer risk. The second methodology involves the calculation of radiation dose which is then compared to a health-based criteria, with 15 millrem/yr (mrem) currently proposed by EPA. The 15 mrem/yr effective dose equivalent is approximately equal to a cancer risk of 3×10^{-4}. The identification of radiological constituents of potential concern for inclusion in the quantitative risk assessment is accomplished by screening against risk-based activities RBAs) in a manner identical to screening of chemicals against risk-based concentrations (RBCs). The RBAs are calculated using exposure assumptions and procedures identical to those used for calculating RBCs (with modifications that are appropriate for radiation/radionuclides).

The approach to risk assessment for radionuclides is conceptually identical to that for chemical risk assessment. There are necessarily some differences in details. For example, radiological risk assessments must consider the effects of external gamma radiation, as well as exposure routes such as ingestion and inhalation.

The risk assessment for Cluster 3 was originally accomplished approximately two years ago, using an approach that, at that time, was considered by regulatory authorities to be acceptable for APG sites. When the Cluster 3 RI report was finalized in August of 1998, the original radiological risk assessment was used, but at the same time a reassessment was accomplished using the currently accepted methodology discussed in the above paragraph. RESRAD is simply a computer program that can be used as a tool to calculate dose estimates given radionuclide concentrations in environmental media and exposure assumptions.

The RESRAD model calculations for the reassessment included estimates of risk from ingestion of soil/sediment, ingestion of groundwater and external radiation. Soil was the only source term used in the RESRAD calculations, and groundwater exposure was based on RESRAD estimates of transfer between media rather than actual groundwater data. Inhalation was not included as an exposure route because it is not significant for the Cluster 3 site. For Cluster 3, nearly all of the estimated risk is from external radiation because Cs-137 and K-40 are strong gamma emitters. Default input parameters for RESRAD were used in the Cluster 3 risk assessment, and assume a subsistence farming land use scenario. This scenario is conservative because it allows for a relatively high level of exposure to soil and the crops grown in it.

In discussing radiological risk assessment, it is also important to understand that the data used in the radiological risk assessment is from gamma spectrometry analysis. Gamma spectrometry is a very useful screening tool for identifying radionuclides that may be present and the approximate level of activity within a media sample. However, it must be recognized that not all gamma spectrometry data are of sufficient precision and accuracy for use in a quantitative risk assessment, and are appropriate only for initial screening level site assessment and estimates of risk. Gamma spectrometry data often have a high relative level of uncertainty at low concentrations near the detection limits, which is often the situation when analyzing environmental samples, and is the case for the Cluster 3 samples. The interpretation of gamma spectrometry data must include evaluation of the estimated concentration relative to the detection limit, the total propagated uncertainty relative to the estimated concentration, and the potential for interference.

The precision and accuracy of gamma spectroscopy data are dependent on a number of factors, including the radionuclide of interest. Gamma spectrometry is generally a relatively good method for identifying and quantifying the concentrations of strong gamma emitters in a sample. For example, gamma spectroscopy provides relatively good data for Cs-137. The detection efficiency for other radionuclides relative to Cs-37 can vary substantially, with a factor of 20 not being unusual. This variation in detection efficiencies is greater than for gross alpha and gross beta analyses, where relative detection efficiency factors are more typically in the 3 to 4 range.

The results of gamma spectrometry analysis are subject to interference because different radionuclides can have emissions at the same energies. For example, both radium-226 and uranium-235 are naturally occurring and have an emission energy of 186 Kev as part of their characteristic emission spectrum. U-235 also has emissions at higher energy levels and in interpretation of the data a computer estimates the relative amounts of Ra-226 and U-235, but not always with a high degree of accuracy. The combination of this interference and uncertainty in analysis are the reasons why it is not uncommon for gamma spectrometry to show Ra-226 levels that are inconsistent with and much higher than the gross alpha measurement. In such an instance the gross alpha should be used to assess the maximum levels of Ra-226 that could be present in the sample. When there is inconsistency between gross alpha data and Ra-226 data from gamma spectrometry analysis, radium analysis should be accomplished using more suitable methodology.

The best method of analysis depends on both the radionuclide of interest and also the media of concern. For Ra-226 in water, radon emanation is the methodology that is appropriate for drinking water sample analysis, and for generation of data for use in quantitative risk assessment where radionuclides are of concern. The measurement of activity by alpha emitters in water is most commonly accomplished by alpha spectrometry. Because of the nature of alpha and beta radiation, gamma spectrometry is the most commonly employed method for soil analysis. In recent years the approach to radiochemistry analysis for some study areas has been to perform gross alpha, gross nonvolatile beta and gamma spectrometry analyses on all samples. The routine use of gamma spectrometry for all samples at APG is being discontinued, and gross alpha and gross nonvolatile beta will be used as screening tools. For water samples, further analyses will follow the approach used for drinking water sample analysis. For soil samples, further analysis will be accomplished when there is evidence of radionuclide contamination at a site. This is the commonly used approach at CERCLA sites, including at DOE facilities.

The Cluster 3 remedial investigation and risk assessment were accomplished using the best available data, which for radionuclides is entirely from gamma spectrometry analysis. The radiological portion of the human health risk assessment has been revised using the latest accepted procedures. This revised risk assessment determined that Cluster 3 risks associated with radionuclides are not substantially different from risks associated with local background concentrations.

When considering radionuclides in the environment, it must also be remembered that many are naturally occurring, and that certain others are man-made and found in environmental media as a result of historical nuclear weapons testing. For example, potassium-40 (K-40), Ra-226 and thorium-228 (Th-228) are naturally occurring, and cesium-137 is a man-made radionuclide that is commonly found in environmental media as a result of fallout from weapons testing during the 1940s and 1950s.

K-40 is of relatively high abundance (0.0117%) and Ion g half-life (1.28 billion years). Because potassium is a very abundant element in nature, it is common for a substantial portion of nonvolatile gross beta activity in samples to be due to naturally occurring K-40. K-40 is also a gamma emitter, and the greater abundance of potassium in clay minerals than in silica sands is the reason why natural gamma logs of boreholes can readily identify zones of high clay that will act as low permeability confining units and distinguish them from sandy aquifer zones. K-40 is also commonly found in solution in surface water and groundwater, and is often the principal source of nonvolatile gross beta in groundwater samples. Unfiltered groundwater samples will often have very high levels of nonvolatile gross beta activity when they contain suspended silt and clay particles, because those particles contain potassium.

Comment No. 19: "The proposed plan states that there is no historical documentation of what was disposed of at the site. However, the community was recently informed that Chemical, Biological Defense Command (CBDCOM) has a 4-story vault containing historical records of their activities. These records need to be evaluated as soon as possible. While DSHE may not be able to investigate this information source prior to the Record of Decision for this cluster, every effort should be made to do so before the remedial work at this site begins."

Response No. 19: The 4-story vault referred to is a part of the CBDCOM Technical Library system. The classified card catalog for this library was thoroughly reviewed as an element of the RCRA Facility Assessment for the Edgewood Area of APG. Thousands of documents in this library were reviewed for information related to waste management. Environmental studies and reports were not prepared during the period prior to World War II, and the logbooks and technical reports of the library only make occasional reference to methods of waste disposal, and most often do not mention the exact location of disposal activities. None of the library documents reviewed describe the OBRRD or the nature of wastes disposed at that site. While it cannot be stated with certainty that there are no documents within the library containing such information, the review work already accomplished suggests that a 100% review of library documents would provide little if any information related to the OBRRD. It is unlikely that information from historical documents would change the conclusions of the remedial investigation and feasibility study, and would not change the conclusion that the presumptive remedy, containment, is the most reasonable remedial approach.

Comment No. 20: "The groundwater flow and contamination migration issues appear complicated in the Cluster 3 area, and our TAG review of the available information has raised multiple concerns. Included in these observations is the potential that the identity of the different aquifers may have been misinterpreted. Furthermore, the presence and migration of certain classes of contaminants need to be meticulously reviewed, as APG's ability to assess present and. more importantly, future exposure pathways depends on the comprehensive evaluation of known contamination, environmental fate and potential sources. This request to review such issues is supported by the determination that the non-cancer health risks to a future worker, via groundwater. exceeds the hazard quotient of 1, which is not discussed in the PP. APGSCC requests that APG and the EPA evaluate these concerns described below to ensure that these important issues are being assessed adequately. A written assessment would be appreciated, although a follow-up meeting may be necessary if the response does not clearly outline the logic and supporting data for the conclusions drawn in these CERCLA documents."

Response No. 20: The issues related to groundwater occurrence and interpretation of aquifer zones is complex at Cluster 3, and because of this complexity, a substantial effort was made to coordinate the interpretation and remedial investigation description with geologists from both EPA Region III and the MDE prior to publication of the remedial investigation report. It is hoped that the following responses (21 through 27) to specific comments will be informative and helpful. APG also is willing to hold a follow-up meeting to help clarify issues.

Comment No. 21: "The proposed plan indicates that because the groundwater has been classified as a type III aquifer, water quality criteria were used in the evaluation process instead of maximum contaminant levels (MCLs). However, the MCLs were used as the comparison criteria in chapter 4 of the Remedial Investigation Report. It has been an ongoing practice at APG in recent years to select chemicals of concern based on the EPA's risk-based concentrations (RBCs) from Region III, which were used in the baseline risk assessment discussion in Chapter 6 of the remedial investigation Report. What was the reasoning for the alternating comparisons?"

Response No. 21: Different comparisons were made because in each of the circumstances the objectives of interpretation and discussion were different. While the groundwater has been classified as a Type III aquifer, it is still useful and necessary to discuss nature and extent of contamination in groundwater. Chapter 4 of the remedial investigation contains comparisons to Maximum Contaminant Levels (MCLs), and to RBCs for tap water for constituents without MCLs. because these comparisons are useful tools in discussion of nature and extent of contamination. In Chapter 6 of the remedial investigation, the risk assessment, constituents of potential concern are identified by screening against appropriate RBCs (or RBAs for radionuclides). MCLs are not used in this screening to identify COPCs because MCLs, while based at least partly on health considerations, are not set at a concentration that correlates to a specific level of risk. Therefore, the RBCs for tap water are a more conservative and consistent screening tool for risk assessment. In the feasibility study and proposed plan, the objective was to illustrate that the discharge of shallow groundwater to surface water was very unlikely to have any adverse impact on surface water, therefore the Federal Ambient Water Quality Criteria (FAWQC) were used as appropriate comparison criteria. Please see the responses to following comments for related discussion.

Comment No. 22: "There appears to be significant disconnect between the nature and extent of contamination discussed in Chapter 4 of the remedial investigation Report, the baseline risk assessment discussed in Chapter 6, and the groundwater contamination referenced in the proposed plan. With regard to organics, Chapter 4 discusses 1,1,2,2-tetrachloroethane and a variety of pesticides, However, the baseline risk assessment included compounds such as benzene. benzo(a)pyrene. carbon tetrachloride and chloroform as chemicals of potential concern (COPC). while many of the pesticides and 1,1,2,2tetrachloroethane were not assessed in the risk assessment. Also. certain inorganics were selected as COPCs but not discussed in Chapter 4, including cobalt and vanadium. Complicating anyone's effort to participate in this process even further is the fact that the proposed plan mentions cadmium as the only chemical of concern identified by the risk assessment process. but this metal is not discussed in Chapter 4 or Chapter 6."

Response No. 22: The differences in discussion between Chapters 4 and 6 of the RI report are due to the differences in the objectives of the discussion. Chapter 4 is a presentation of nature and extent of contamination. Chapter 6 is an assessment of risk to human and ecological receptors.

The differences in constituent discussion is in part a function of the data screening process for the two chapters, which has already been discussed in the response to comment no. 21. An example of how the two data screening processes can result in focus on different sets of constituents can be illustrated by considering benzene in groundwater. Benzene was detected in 1 of 11 surficial aquifer groundwater samples at a concentration of 1.4 ug/L. This concentration is less than the MCL of 5 ug/L, and was not the focus of discussion in Chapter 4 of the remedial investigation. However, the single detected concentration does exceed the RBC for tap water, and was designated as a COPC in Chapter 6.

APG recognizes that this difference in data screening and presentation approaches can be confusing and misleading. More recent remedial investigation reports now in preparation are using a slightly different approach in Chapter 4 of the RI report, Tables for each environmental media at each waste unit/site/area of interest will list all detected constituents, the frequency of detection, other summary statistics including range of detected concentrations and mean concentration, and comparisons to (1) background concentrations, (2) ARARS (MCLs for groundwater, etc.), and (3) risk-based screening levels for human health and ecological receptors, as appropriate. This approach will present a wide range of information, and better illustrate to readers the range of constituents that may be related to site historical activities, those for which there may be some associated risk (human or ecological), and finally, those that exceed ARARs. This approach will also be more consistent with and a better lead-in to fate and transport analysis in Chapter 5 and the risk assessment in Chapter 6.

CommentNo. 23: "With regard to groundwater, the geological cross sections (figures 3-5 through 3-7) within the RI appear to have an area of discrepancy. Figure 3-6 presents a wide surficial aquifer northwest of the landfill, stretching from 10 - 25 feet above mean sea level (MSL). In this cross section, the surficial aquifer is shown to reduce in thickness and more downward to 0 MSL at WBR-06 and WBR-04. These two data points are in close proximity to WBR-05. Figure 3-5. depicting the geology at WBR-05, shows the canal creek aquifer to be present at 0 MSL. Please explain this observation in the data."

Response No. 23: The information in the report is correct and demonstrates the discontinuous nature of the surficial aquifer within Cluster 3. What is portrayed in the cross sections is the best interpretation based on lithology at the boring/well locations. This APG interpretation was reviewed and considered reasonable by geologists of the Army Corps of Engineers, MDE and EPA Region III.

CommentNo. 24: "We need to assess what ramifications are possible from the hydraulic connection between the surficial and canal creek aquifers with regard to long-term contamination migration. It should be noted that in the feasibility study, the aquifer identified as the surficial aquifer is in close proximity to what is identified as the Canal Creek aquifer. It is not clear that this shallower aquifer is separated from the lower water-bearing unit by a continuous confining layer. In fact, the cross-sections provided in the FS suggest that as one moves from the area which the two streams converge at the head waters of Lauderick Creek back toward the marsh area to the west of the proposed cap area, the two aquifers come closer together. Why has APG contractors not developed a three-dimensional model of the subsurface? If these aquifers are connected, the notion from APG reports that contamination in the Canal Creek Aquifer originated from the west in the Canal Creek Study Area would be questionable."

Response No. 24: In the area immediately west of Cluster 3 the Canal Creek Aquifer is also the surficial aquifer. As one moves eastward into the Cluster 3 area, the Canal Creek Aquifer dips, becoming separated by Cretaceous confining clays from a surficial aquifer that is discontinuous in nature and very thin or absent in some areas. (see Figures 3-3 and 3-5 through 3-7 of remedial investigation report and Figures 1-5 through 1-9 of the feasibility study report). The possible connection between the surficial and Canal Creek aquifer zones in this area has been given much consideration, and the most definitive evidence is from water level measurements that show a large difference in groundwater elevation between the two aquifer zones throughout the Cluster 3 area. This large difference in groundwater elevation (approximately 12 ft) indicates that there is no hydraulic connection between the Canal Creek Aquifer and the surficial aquifer (where it exists) in the Cluster 3 area.

The cross sections are a three-dimensional model depicting the interpretation of lithology within the area. No numerical groundwater flow model has been developed because groundwater is not a transport pathway for constituents of concern from the OBRRD (other than seepage of perched water within the fill material created by the lower permeability of the fill material relative to surrounding native soils, which is discussed in the feasibility study report).

CommentNo. 25: "While it is not discussed in the proposed plan, nickel is present in the Canal Creek Aquifer at well WBR-03, located at the southern perimeter of the OBRRD. In fact, nickel is present in this aquifer at concentrations above 2,000 ppb, which is more than 20 times the MCL for this metal. As the IRP is aware, other compounds including 1,1,2,2-tetrachloroethane, alpha-BHC, gamma-BHC (lindane) and heptachlor epoxide were found in the Canal Creek Aquifer at this location. Data for various organic and inorganic compounds suggest that contamination in the vicinity of this well migrate toward Lauderick Creek, as various contaminants were found at WBR-08 at the next highest concentrations (nickel was detected at this location in excess of 800 ppb). In light of this, it would seem important to know whether or not this groundwater discharges to Lauderick Creek, where nickel has been found in the sediments above BTAG criteria. It has been shown at other locations including Kings Creek, according to the U.S. Army's *Risk and Biological Impact Assessment,* where contaminants from the Canal Creek Aquifer have been shown to be discharging to surface water bodies."

Response No. 25: Because the Canal Creek Aquifer dips toward the southeast, it is likely that it does not discharge to Lauderick Creek. Even if there was discharge of contaminated groundwater from the Canal Creek Aquifer, the potential impacts would not be unassessed or ignored. Past efforts have assessed the quality of sediment and surface water within Lauderick Creek. and as RI/FS efforts continue at sites within the Lauderick Creek drainage basin, such assessments will continue.

It is also suggested that caution be exercised in the use of contaminant concentrations to determine the direction of groundwater flow. It cannot always be assumed that groundwater movement is from a well location with high concentration toward one with lower concentration of a particular constituent. Site hydrogeology will determine groundwater flow pathways, and dissolved constituents will move along these pathways. Constituent concentrations can provide very valuable insight into groundwater movement, but is secondary to hydrogeologic data in importance in assessing flow pathways.

Comment No. 26: "While there are multiple lines of evidence to suggest that contamination is flowing from WBR-03 toward WBR-08, one must entertain the possibility that WBR-03 may be situated on a divide and that groundwater also flows from this point toward the west (WBR-05) and the Canal Creek Study Area. In fact, I believe IRP personnel at previous RAB meetings have presented information regarding the migration of contamination from the Northern Bush River Study Area toward the Canal Creek Study Area. The detection of the same pesticides and various metals in well WBR-05, as those found at WBR-03, support such a possibility. This observation plus the fact that nickel turned up in other wells believed to be in a different aquifer reinforces the need to resolve the observation discussed above - namely that the IRP must be sure that the surficial and Canal Creek aquifers have not been misidentified from one location to another. These concerns regarding aquifer identification and contaminant migration direction is also supported by the radial flow contours depicted in figures 3-9 and 3-10 of the RI report."

Response No. 26: "Water level data over a period of time shows that groundwater movement in the Canal Creek Aquifer is consistently in roughly an eastward direction across the Cluster 3 area. Constituent concentration data cannot be used alone without hydrogeologic data in assessing groundwater movement. Figures 3-9 and 3-10 of the remedial investigation report are for the surficial aquifer zone, and not the Canal Creek Aquifer.

The presence of nickel in surficial aquifer groundwater at the locations of wells WBR-04, -06 and -07, and in Canal Creek Aquifer wells WBR-05 and -03, suggests that there was a historical source of nickel in Site 23, as stated in the remedial investigation report. A review of the data for the Canal Creek study area indicates that nickel is one of the most common inorganic constituents to exceed the former MCL level of 100 ug/L, with samples from at least a dozen wells in five widely separated areas having such levels of nickel (*Canal Creek Study Area, Remedial Investigation Progress Report, Edgewood Area, Aberdeen Proving Ground, Maryland*, Jacobs Engineering Group, September 1995). The available data are not adequate to determine if the nickel detected in the Cluster 3 area is from upgradient sources within the Canal Creek study area.

The risk assessment did not identify nickel as a final constituent of concern for groundwater. There is no longer an MCL for nickel, and the groundwater at Cluster 3 is a Type III aquifer to which MCLs do not apply.

Comment No. 27: "Gross beta readings were found to be elevated compared to background at WBR-03, WBR-04 and WBR-10, at concentrations of 31, 24 and 97 pCi/L, respectively. In addition to our concerns regarding the migration of contaminants at WBR-03, as discussed previously, APGSCC is also concerned about the presence of elevated radiological data in groundwater so close to on-post housing (less than 200 feet). It should be noted that gross alpha was also detected at this well at 25 pCi/L+/-10, which would place it at the MCL for alpha radioactivity of 15 pCi/L. Gross beta was found consistently at this location between 90 and 110 pCi/L for three consecutive rounds. The RAD risk discussion in

Chapter 6 does not mitigate concerns generated by these data. In fact, section 6.3 the MCL for Radium (RA)-226 and Ra-228 combined is 5 pCi/L while Ra-226 was detected in the groundwater at Cluster 3 at 7.7 pCi/L. A proposed rule was mentioned for Ra-226 of 20 pCi/L in the text, but the significance of this proposed rule versus the current standard is not discussed."

Response No. 27: The elevated gross beta levels are due to naturally occurring potassium-40. Of the three mentioned wells, only for WBR-10 did groundwater samples consistently show high gross beta. The groundwater samples from this well were also quite high in total potassium, with detected concentrations ranging up to 94.5 mg/L. For this total potassium level, the nonvolatile beta activity due to naturally occurring K40 would be approximately 80 pCi/L. In the sampling of a monitoring well, it is common for there to be substantial variation in amounts of suspended solids between sample containers for various analytes. The sampling plan for Cluster 3 specified that the sample container for radionuclides be the last container filled. As the last container filled, it would have normally contained the greatest amount of suspended solids, and with analysis of unfiltered samples, would have caused gross beta measurements to be elevated due to K-40. The elevated levels of total potassium in samples from this well are due to grout contamination within the screened interval created during well installation operations. A high pH, another characteristic of grout contamination, is also observed in water samples from this well.

As noted in the response to other comments, the gamma spectrometry methodology for water commonly provides erroneous results for Ra-226.

A review of the radiochemisrtry data for Cluster 3 does not show any evidence of contamination by radionuclides, with results being consistent with naturally occurring levels and variability typical for gamma spectrometry analysis.

Comment No. 28: "This same section mentions that RESRAD was used to back-calculate acceptable soil concentrations, but does not discuss how the groundwater issue was evaluated. APGSCC requests that the presence of this radiological contamination be evaluated under the best risk assessment procedures available and that APG evaluate possible sources for such contamination, including natural and anthropogenic possibilities. To make this process transparent to the public, the TAG Group needs a copy of the RESRAD model to evaluate its design. Furthermore, APG, the EPA and APGSCC need to meet to assess the input parameters used in the model for APG. Lastly, the risk evaluation process must be clearly delineated within the text of the CERCLA documentation for this and other APG sites of concern. It remains imperative that APG develop a comprehensive, clear approach for assessing risk from radiological contamination, and the need to adequately evaluate radiological risk at Cluster 3 is supported by the data from other media discussed below."

Response No. 28: Please see Response No, 18 for a discussion on handling of groundwater. A clear and comprehensive approach to risk assessment for radionuclides has been adopted by APG, and will be seen in future risk assessments.

Comment No. 29: "Lead was found in a few surface water samples collected, with at least one sample exceeding its water quality criterion. While the proposed plan does not identify it as such, the comparison criterion used in this assessment appears to be the acute concentration, which is much higher than the chronic criterion. Given that the landfill is a constant source in the area and continuously releasing contamination, it is not clear why the acute criterion has been accepted in this assessment. Furthermore, a

majority of the samples analyzed were collected in two rounds during a fairly small time window between October 24 and November 13, 1996. It is questionable whether this sampling approach would give a reasonable picture of contamination, considering the various environmental factors from one season to the next that would influence run-off, contaminant solubility, etc. In support of this concern, it is worth noting the samples that revealed surface water contamination in excess of the water quality criteria were collected in early September and late March, both months of which represent environmental conditions considerably different than the last October/early November time period. Gross beta readings were found in both surface water samples at fairly consistent concentrations, 58 and 73 pCi/L, respectively. This is worth noting since a considerable distance separates the two sampling points. While the RI Report notes that the concentrations were much lower in the second round, this is not surprising since consistent detections in surface water is not common for sites where groundwater discharge or surface runoff are the most likely avenues for this contamination to reach the surface water body. APGSCC requests that additional surface water sampling be conducted to evaluate the persistence of the lead and radiologicals."

Response No. 29: APG recognizes that a thorough understanding of contaminant transport from the OBRRD via surface water and sediment is important. While the proposed remedy for the OBRRD will eliminate releases from the source area, it is important that monitoring measure the effectiveness of this remedy, and also develop data that can be used to assess the long-term ecological risk associated with constituents already in sediments of Lauderick Creek. APG is planning to conduct sampling and analysis of sediment because constituents have migrated to nearby Lauderick Creek sediments via sediment erosion and transport. The monitoring will include multiple sampling events from before until after construction, and will include sediment chemistry as well as sediment bioassay. This monitoring will assess seasonal effects and trends, and will include assessment using appropriate toxicity reference values. APG is also considering the use of sediment bioassay as a long-term monitoring tool.

The types of constituents that are of concern at the OBRRD have a relatively low water solubility and high soil/water partition coefficient, and as a result are primarily associated and transported with sediments (as opposed to solute transport). Because of these characteristics, future monitoring will focus on sediments rather than surface water. Transport of constituents will be associated with storms or other events that disturb source areas or sediments, and will typically be short in duration.

Comment No. 30: "These same issues exist for the few sediment samples collected. Specifically, lead was found in both remedial investigation samples above the maximum reference concentration; for one location the lead was present at a concentration 10 times greater than the BTAG criterion of 46.7 ppm. Radiological contamination was also found in both remedial investigation sediment samples at 28 and 32 pCi/L. Interestingly, the man-made isotope cesium was present at both sites as well, although cesium-137 and potassium-40 were reported to be detected below background levels collected by the Maryland Department of Natural Resources. Radium-226 was present in sediment at levels greater than background (1.80 vs. 1.98 pCi/g). Lastly, we are concerned that the isotopes reported only account for 1/4 - 1/3 of the gross beta measured in the sediments. While the lead contamination was mentioned in the PP, the radiological contamination was not included. As acknowledged in the PP, sediment samples exceed the BTAG criteria for metals. Upon review of the FS (fig. 1-10). these contaminants include arsenic, beryllium, lead, mercury and nickel. From the data reviewed. it does not appear that there are many samples from the marsh and Lauderick Creek outside the selected area for cap construction. With the limited number of samples in Lauderick Creek, it is not clear that an adequate assessment of contaminant migration and ecological impacts has taken place. APGSCC requests clarification as to the role the EPA Biological Technical Assistance Group (BTAG) played in evaluating the ecological issues regarding

Cluster 3 and the adjacent water body. Additionally, please explain why bioassays were not conducted with regard to the contamination in the marsh surrounding the landfill and in Lauderick Creek?

Response No. 30: Please see responses to other comments concerning plans to assess metals in sediment by sampling, chemical analysis, and laboratory bioassay testing. Please also see other comments concerning the presence of naturally occurring and man-made radionuclides in environmental media, as well as the limitations of the gamma spectrometry method of analysis. There are no indications of radionuclide contamination at Cluster 3 or the OBRRD. Please see response to comment no. 18 for further discussion.

Please see responses to other comments concerning plans to assess metals in sediment by monitoring and bioassay. Please also note that the proposed remedy will prevent any further release of constituents from source areas in the OBRRD, and that the remedy can be accomplished without further data assessing impacts on Lauderick Creek. Bioassays have been performed with sediment samples collected within the main portion of Lauderick Creek and have not identified toxicity problems. That work did not address the tributary portion of Lauderick Creek immediately downstream of the OBRRD, which will be the focus of the planned monitoring and assessment.

Comment No. 31: "Furthermore, the proposed plan asserts that the contamination in the sediments has come from past or continuing slumping and erosion of the surface of the OBRRD. Yet, as acknowledged in the previous sentence within the proposed plan (page 6), it is also possible that such contamination is coming from the anomaly areas detected in the marsh (the push out areas). Given the 1) lack of sampling conducted outside the area to be capped, 2) the data gaps regarding the source(s) of contaminants detected in the sediment samples that were collected in Lauderick Creek, and 3) the funds saved by capping the site instead or removing the source, APGSCC requests that additional sediment and surface water sampling be implemented as part of the ROD and long-term monitoring efforts to further evaluate the extent of contamination in the marsh and the effectiveness of the cap in reducing further deterioration of the surface water body."

Response No. 31: The push out areas mentioned are a part of the OBRRD and will be addressed by the proposed remedy. There is no further need to conduct sampling and analysis to support the remedial decision process for the OBRRD. Sampling and analysis of sediment, as well as sediment bioassay, is planned to evaluate the implementation and effectiveness of the remedy, and to provide data necessary to support assessment of long-term ecological risk associated with constituents already transported downstream from the OBRRD.

APG believes that there is sufficient justification to proceed with remediation of the OBRRD as a source area to ensure that there is no further release of constituents of concern to Lauderick Creek. The planned monitoring will be separate from the decision process and ROD, allowing rernediation to proceed.

Comment No. 32: "Gross beta were elevated in all soil samples collected from Cluster 3. Cesium was present in all samples and other isotopes including radium-226 and thorium-228 were detected. Although it is not discussed in the PP, the baseline risk assessment chapter in the RI notes that Ra-226 was detected in soil and sediment at concentrations three and two times higher than concentrations corresponding to the 15 mrem-per-year dose level, respectively. Yet, no other discussion takes place in this chapter on the ramifications of such exceedances.

Response No. 33: Please see other responses related to radiochemistry and the natural and anthropogenic occurrence of radionuclides. A review of the radiochernistry data for Cluster 3 does not show any evidence of contamination by radionuclides, with results being consistent with naturally occurring levels and variability typical for gamina spectrometry analysis.

COMMENTS FROM MARYLAND DEPARTMENT OF THE ENVIRONMENT

The Environmental Restoration and Redevelopment Program (EERP) of the Waste Management Administration provided the following comment.

CommentNo. 34: MDE noted there was an incorrect Code of Maryland Regulations (COMAR) citation in the Proposed Plan and stated it should be deleted.

Response No. 34: APG has deleted the reference.

U.S. ARMY INVITES PUBLIC COMMENT ON PROPOSED PLAN FOR OLD BUSH RIVER ROAD SITE

Aberdeen Proving Ground (APG) invites the public to comment on its Proposed Plan for environmental actions at APG's Old Bush River Road dump site.

WRITTEN COMMENTS

The public may submit written comments on the Proposed Plan during the 45-day comment period which runs from July 31 to September 14, 1998. Comments must be postmarked by September 14 and may be sent to:

Mr. Ken Stachiw
U.S. Army Garrison, ATTN: STEAP-SH-ER
5179 Hoadley Road, APG, MD 21010; or

Mr. Steve Hirsh
U.S. Environmental Protection Agency Region III
1650 Arch Street (3HS50)
Philadelphia, PA 19103; or

Mr. John Fairbank
Maryland Department of the Environment
Waste Management Division
2500 Broening Highway, Baltimore, MD 21224

Also, starting August 4, you can review the Proposed Plan and provide comments through the APG Web Site at http://www.apg.army.mil; click on "Environmental Cleanup," then click on "Public Participation," and then click on "e-mail response form."

PUBLIC MEETING

DATE: Tuesday, August 18, 1998
TIME: 6:30 p.m. - poster/information session
7:15 p.m. - presentation
8:00 p.m. - questions & answers/poster session
PLACE: Edgewood Senior Center
1000 Gateway Road
Edgewood, MD 21040

The meeting location is wheelchair accessible, and an interpreter for the hearing impaired is available with 72-hours advance notice

FACT SHEET

APG has prepared a fact sheet on the Proposed Plan which includes a comment form that can be returned to APG. If you are not on APG's mailing list, you can request a copy of the fact sheet by calling APG's 24-hour Environmental Information Line at (410) 272-8842 or (800) APG-9998.

SITE HISTORY AND ENVIRONMENTAL STUDIES

The former dump site is in the northeastern portion of APG's Edgewood Area and is part of the Bush River Study Area. The site predates World War II and may have existed before 1917 when the Edgewood Area became government property. Aerial photographs indicate the site was active from at least 1929 through the early 1940s. The 15-acre site is fenced and contains many areas where material is either uncovered or partially covered. The site appears to have been a disposal area for household and military wastes and demolition debris; unexploded ordnance also may be present.

APG's environmental investigations found some low levels of metals in the soil which appears to be spread by rain and erosion. The Army is proposing action to stabilize the site and reduce erosion, minimize infiltration of water through the site, and provide protection in the event ordnance is present.

ALTERNATIVES EVALUATED

APG, EPA and Maryland Department of the Environment evaluated the following alternatives:

Alternative 1: No Action - The law requires APG to evaluate taking no action to establish a baseline for comparison with other alternatives. Under this alternative, the Army would conduct long-term monitoring. Cost: $328,323

Alternative 2: Composite Cap – This type of cover system consists of multiple layers and is commonly used for municipal and hazardous waste landfills. Cost: $1,701,884

Alternative 3: Soil Cap – The first layer of the soil cap would be a three-foot foundation layer which would be covered by a ½-foot layer of topsoil. The cap would be thicker in some areas to level the surface. A vegetative cover would be placed on top of the soil to reduce erosion and minimize infiltration. Wastes outside of the limits of the proposed cover would be excavated and placed beneath the soil cap. Cost: $1,298,564

Alternative 4: Vegetative Barrier Cap – This alternative is an innovative technology which uses special vegetation, such as poplar trees, to reduce infiltration through transpiration. The vegetative barrier cap would be combined with a soil cap. Cost: $1,308,699

Based on their analysis, APG and EPA prefer Alternative 3, Soil Cap. The Maryland Department of the Environment will finalize its position after reviewing public comments.

The preferred alternative may be modified or a new alternative may be developed based on public input. The final study selected will be documented in a Record of Decision that summarizes the decision-making process. APG will summarize and respond to all written comments received during the comment period as part of the Record of Decision. Copies of the Proposed Feasibility Study and the Proposed Plan will be at the APG information repositories as of July 31. The repositories are located at the Edgewood and Aberdeen branches of Harford County Library and Miller Library at Washington College in Kent County.

QUESTIONS?

If you have any questions, please call APG's 24-hour Environmental Information Line at (410) 272-8842 or (800) APG-9998.

MARYLAND DEPARTMENT OF THE ENVIRONMENT
2500 Broening Highway ! Baltimore Maryland 21224
(410) 631-3000 ! 1-800-633-6101 ! http://www.mde.state.md:us

Parris N. Glendening
Governor

Jane T. Nishida
Secretary

October 15, 1998

Mr. Ken Stachiw
Directorate of Safety, Health and Environment
U.S. Army Aberdeen Proving Ground Support Activity
Aberdeen Proving Ground MD 21005-5001

RE: Bush River Study Area, Edgewood Area, APG, Proposed Plan. Cluster 3, Site 3, Old Bush River Road Dump, July 1998

Dear Mr. Stachiw:

The Maryland Department of the Environment, Waste Management Administration (MDE/WAS) has reviewed the above-referenced document. This review indicated that a Code of Maryland Regulations (COMAR) citation was incorrectly referenced in the subject document as an Applicable or Relevant and Appropriate Requirement (ARAR). Unfortunately, during the development of the Feasibility Study for this site, the Federal Facilities Section of the Environmental Restoration and Redevelopment Program (ERRP) erroneously identified the citation from COMAR 26.13.14 as a potential ARAR for the subject action. The error was then transferred to your document.

Once this error was identified, the correct citation was reviewed in some detail. Following the reevaluation of COMAR 26.13.05.14, which is in the State's Hazardous Waste regulations, ERRP does not believe that the cited COMAR is more stringent than the equivalent Federal regulation. Therefore, COMAR 26.13.05.14 should not be considered State ARAR for this action. Please revise the subject document by deleting the reference to COMAR. 26.13.14.

The subject document adequately presents the Army's proposal to construct a soil cover on the Old Bush River Road Dump. The action is expected to reduce further erosion and mitigate exposure to unexploded ordnance. This action will address the concerns identified during the remedial investigation of this site, principally, further erosion of material at the site and direct exposure to unexploded ordnance buried at the site. The Army's commitment to long-term monitoring will further ensure that the action sufficiently addresses site concerns. The ERRP considers the actions proposed by the Army to be appropriate to the circumstances at this site.

If you have any questions, please contact me at (410) 631-3440.

Sincerely,

John Fairbank, Chief
Federal/NPL Superfund Division

cc: Mr. Steve Hirsh
Mr. Richard Collins
Ms. Hilary Miller
Ms. Shari Wilson